SITE SELECTION PROCESS PHASE 4A:
TECHNICAL APPENDIX LF-3C -
EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee
Associates Limited

Gartner Lee Associates Limited

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September 13, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West,
11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix LF-3C - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site LF-3C.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly
GARTNER LEE ASSOCIATES LIMITED

DSOsmond

for E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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BIOLOGICAL RESOURCES
STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr. - Associate and Senior Biologist of GLAL - Report Review

Kenneth Dance, M.Sc. - Associate and Senior Biologist of GLAL - Report Writing and Project Management

Thomas Hilditch, B.Sc.,Agr. - Biologist of GLAL - Data Collection

Donald Fraser, M.Sc. - Biologist of GLAL - Site Report Preparation

Wayne Weller, M.Sc. - Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site LF-3C and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Eight natural vegetation cover types occur on the site, including examples of both upland and lowland deciduous forest. No special vegetation associations or Significant Environmental Units are present.

A total of 134 plant species is known from Site LF-3C, of which four are considered rare. Wildlife related data indicate the presence of 62 bird species, 14 mammals, five reptiles and amphibians and one fish. One bird species and one mammal species are considered rare.

Forestry related activities include sawlog and fuelwood harvesting and maple syrup extraction. Some mammal trapping takes place, however hunting is a minor activity. Pike spearing occurs during the spring spawning runs.

The entire area of one Significant Environmental Unit and portions of two others occur within the LF-3C site vicinity. Pike spawning occurs in Beaver Creek and the Welland River. Wetlands associated with the margins of the Welland River serve as waterfowl production areas.

Seventeen rare plant species, one rare bird and one rare mammal have been recorded in the site vicinity.

1.0 INTRODUCTION

1.1 BACKGROUND

The Ontario Waste Management Corporation (OWMC) is involved in a five-phase process for the selection of a siting option for facilities to treat liquid industrial and hazardous wastes. This process has incorporated input from a number of areas of expertise including agriculture, biology, hydrogeology, socioeconomics and transportation.

At the end of the third phase of the site selection process, eight candidate sites within the Golden Horseshoe region of southern Ontario were identified (OWMC 1984). Biological factors developed to fulfill OWMC's goal of minimizing environmental impact were among several factors used in selecting the eight candidate sites. Gartner Lee Associates Limited completed the technical input for biology as reported in "Site Selection Process, Phase 3B: Selection of Candidate Sites - Biology" (GLAL 1984g). In that report, Site LF-3C was thought to possess moderate biological constraints.

This report is a technical appendix to "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology" that documents and interprets field data and available biological information for Site LF-3C. It serves as a data base for comparing the eight candidate sites in the facility siting selection process.

1.2 SCOPE AND OBJECTIVES

As noted earlier, the previous Phase 3B evaluation of Site LF-3C was based primarily on existing data. For this Phase 4A assessment, the existing data base has been up-graded where possible and field work has been conducted on the site. The sampling and analytical elements of the program have been designed to meet study objectives and to provide an adequate basis for site comparisons.

Objectives of the Phase 4A biology study are:

- to describe existing biological conditions, on-site and in the site vicinity;
- to refine and confirm the Phase 3B data base through contact with pertinent agencies, experts and the public for both the site and site vicinity, and through field work on-site;
- to determine the level of constraint associated with biological resources;
- to assess the sensitivity and significance of biological resources; and
- to provide the Site Selection Team with biological assessments to use in refining site boundaries and in the siting option comparison.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The bulk of the existing biological information for Site LF-3C is summarized on two maps and in 11 tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

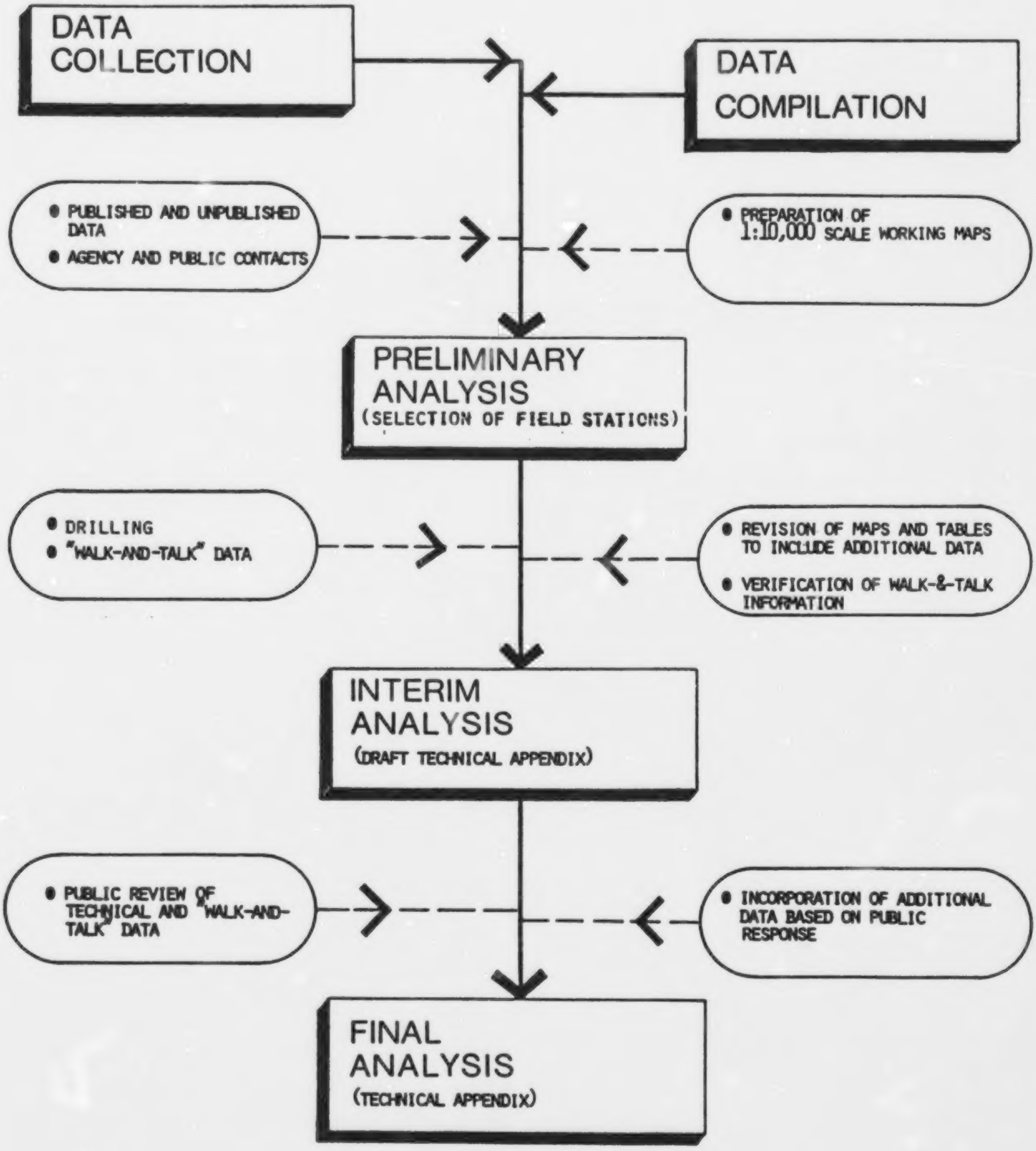
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
• PUBLISHED AND UNPUBLISHED DATA
• AGENCY AND PUBLIC CONTACTS
• PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS
(SELECTION OF FIELD STATIONS)
• DRILLING
• "WALK-AND-TALK" DATA
• REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
• VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS
(DRAFT TECHNICAL APPENDIX)
• PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
• INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS
(TECHNICAL APPENDIX)

Government reports on vegetation and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Niagara Peninsula Conservation Authority and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site LF-3C are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984f), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

Where important features were known prior to field work, efforts were made to check these.

Reconnaissance field studies on Site LF-3C were conducted on September 6 and 7, 1984. Other visits to the site by GLAL biologists occurred on May 15, June 25, July 16 and 17, September 5 and 30, and November 5, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site LF-3C residents on July 16 and 17, 1984.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and "non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 9. These lists should be considered preliminary and may be incomplete.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the LF-3C site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Niagara, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete

evidence such as a photograph and/or specimen, and the potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 9 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences discounted during the preliminary status assessment were not dealt with further. Two of the most common reasons for exclusion were incorrect identifications and changes in status as a result of more recent information.

For example, reports of Wolves (Canis lupus) on Site LF-3C are considered erroneous, as this species is often confused with its close relative the Coyote (Canis latrans). The Wolf was extirpated from much of southern Ontario prior to 1900 (Campbell and Dagg 1972).

Swamp White Oak (Quercus bicolor) was originally designated as rare in Ontario and Canada by Argus and White (1977). A recent status review by Ball (pers. comm. 1984) has indicated that on the basis of its widespread distribution in southern Ontario, Swamp White Oak should no longer be accorded a rare status. This change will be reflected in a forthcoming publication of the Atlas of Rare Vascular Plants of Ontario Program.

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to faunal species which utilize Site LF-3C and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was also not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

A further public meeting to review the preliminary biological information was held on 23 January, 1985. Additional data resulting from public responses were incorporated in the final report.

This technical appendix represents the interpretation of biological features and biological resource use at Site LF-3C to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A" Selection of a Preferred Site(s) - Biology".

3.0 SETTING

3.1 REGIONAL SETTING

Site LF-3C is situated in the central portion of the Niagara Peninsula, roughly midway between Hamilton and Fort Erie. Its position relative to the other seven OWMC Candidate Sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within acquisition boundaries as portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It is 259 ha in size and includes Lots 5, 6 and 7, Concession I in West Lincoln Township, Regional Municipality of Niagara. It is bounded on the west by Regional Road 16, on the north by Elcho Road West and on the south by Zumstein Road. The site is approximately 25 km southwest of St. Catharines, and 40 km southeast of Hamilton. It is about 3.0 km west and north of Wellandport, 3.5 km south of Bismarck and 0.8 km northwest of the Welland River at its closest point. Regional access is gained via the Queen Elizabeth Way and south following provincial and regional roads.

Site LF-3C is located on a portion of the Haldimand Clay Plain. The terrain is generally flat, although a number of shallow, poorly drained depressions (approximately one metre deep) occur in the central and eastern portions of the site. Some contain standing water throughout much of the year.

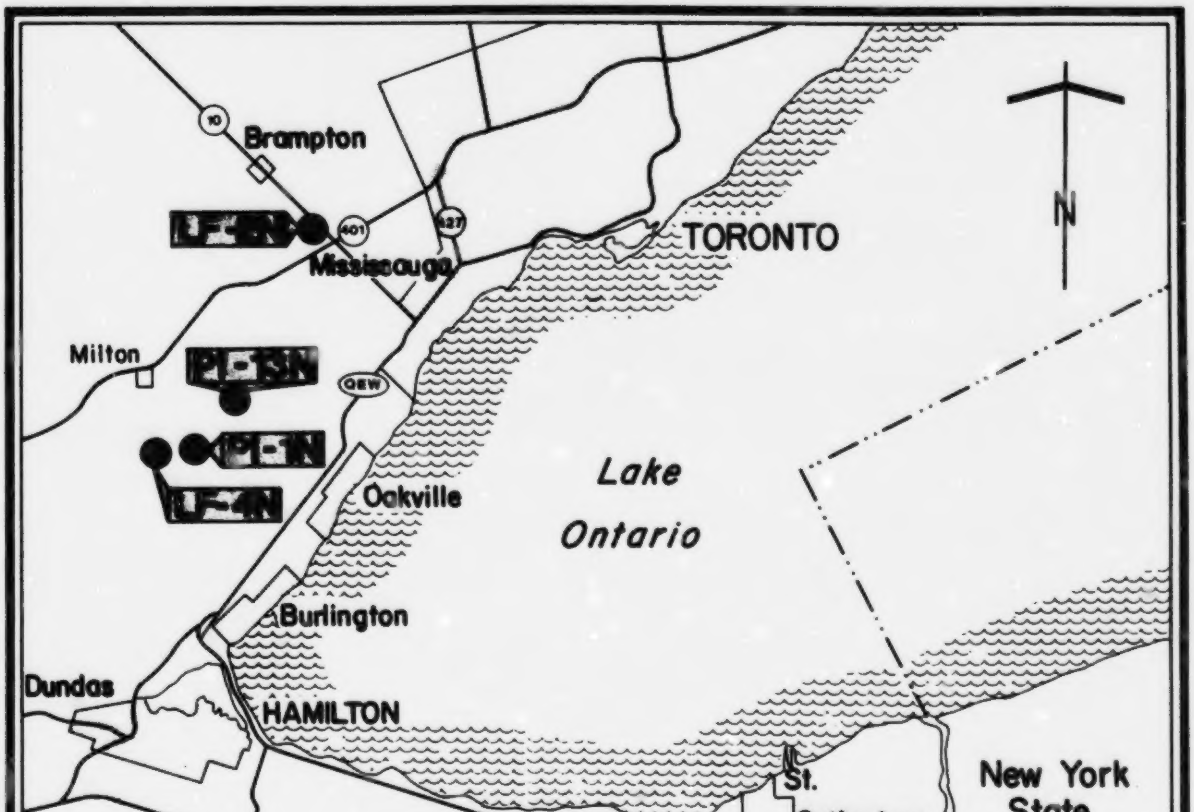

10
Brampton
401
427
Mississauga
TORONTO
N
Milton
PI-13N
QEW
PI-1N
LF-4N
Oakville
Lake
Ontario
Burlington
Dundas
HAMILTON
St.
Catharines
New York
State
20
56
58
Caledonia
Niagara
Falls
LF-9C
20
PI-27E
LF-1E
LF-3C
Welland
QEW
3
3
Dunnville
Wainfleet
Fort Erie
3
Port
Colborne
Lake Erie
Miles 8
0
8
16
Kilometres 10
0
10
20

FIGURE 2 LOCATION OF CANDIDATE SITES

The northern part of the site is traversed by Beaver Creek. Several intermittent streams originate from the southwest corner, eventually draining into the Welland River.

Much of Site LF-3C is characterized by a slough-ridge topography. Consequently, both upland and lowland vegetation associations are present.

4.0 EXISTING BIOLOGICAL RESOURCES - SITE

Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

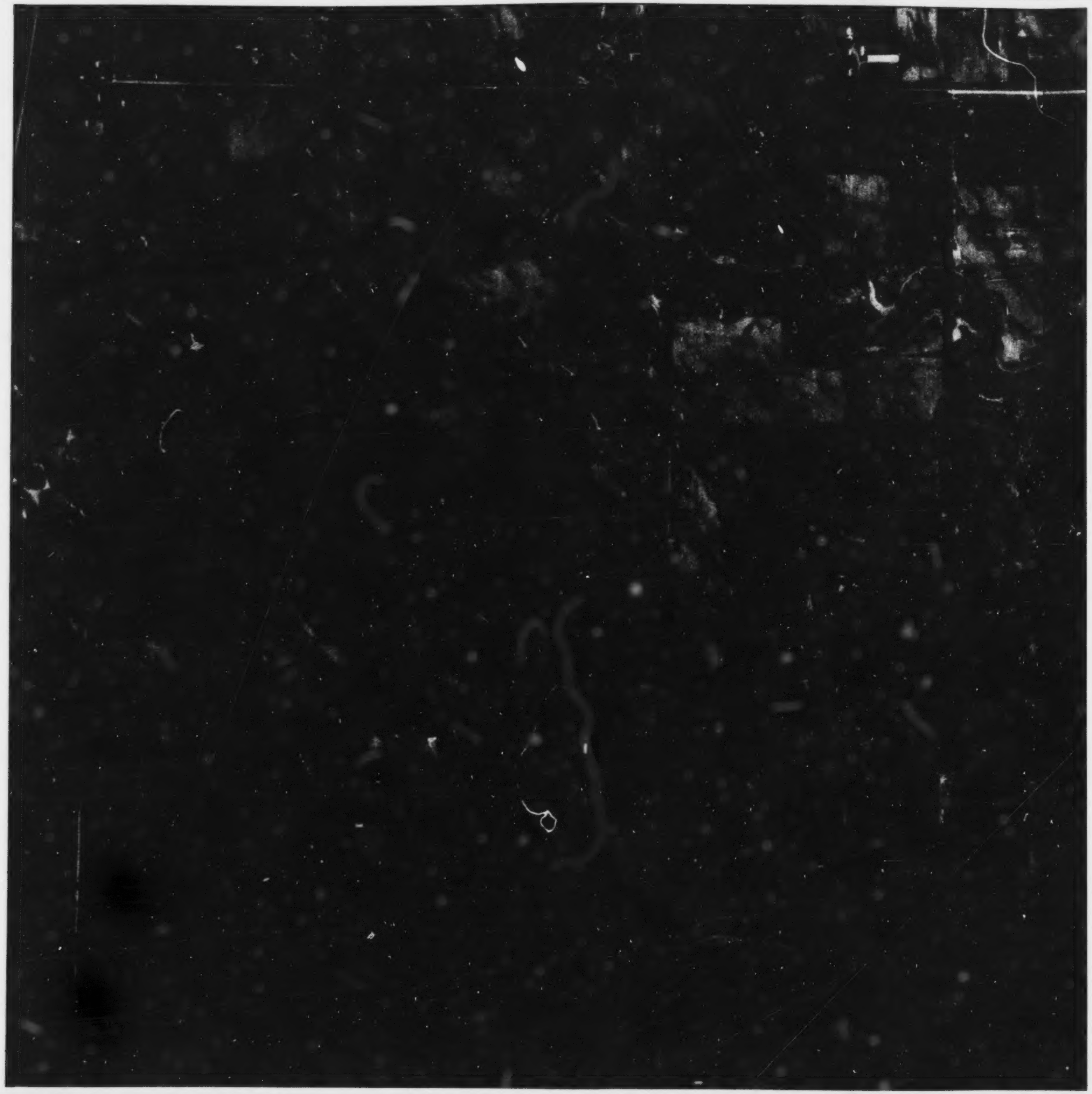
4.1 OVERVIEW OF SITE BIOLOGY

Two woodlots occur in the central and eastern portions of the site (Figure 3) and collectively occupy approximately 15% of the site area. The dominant overstory species are noted in Section 4.2.2.

Smaller naturally vegetated patches also occur on the site, linked primarily to Beaver Creek. Areas of thicket, marsh and old field are present. Lowland thickets associated with wet sloughs are characterized by a dense shrub cover.

Marsh vegetation, found in slough areas throughout the site, is typically represented by Narrow-leaved Cattail (*Typha angustifolia*), Reed Canary Grass (*Phalaris arundinacea*) and Rice Cut Grass (*Leersia oryzoides*).

Sixty-two bird species have been recorded within the acquisition area, 46 of which likely utilize the area for nesting purposes. Fourteen species of mammals, five species of reptiles and amphibians, and one fish have also been recorded from the site.



OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

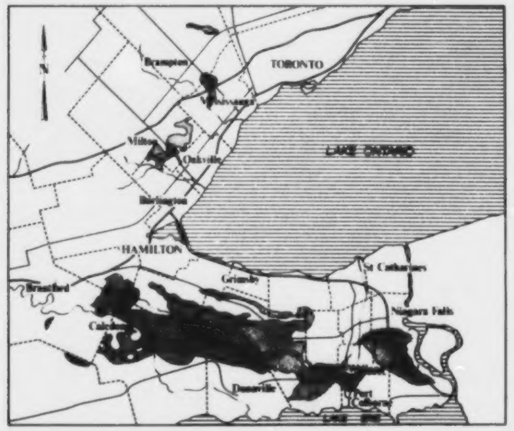
ANIMALS	PLANTS
Op Opossum	Oa Pin Oak
Be Eastern Bluebird	Sa Southern Arrow-wood
	T Tupelo

▭ Forestry Potential

〜 Pike Spawning Areas

▬ Phase 3B Acquisition Boundary *
▬ Proposed Acquisition Boundary * *

Key Map: **LF-3 Central**


N
Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
Brantford
Grimsby
St Catharines
Niagara Falls
Caledonia
Dunnville

* Applied in this technical appendix.

** Derived during phase 4A, see "Site Selection Process Phase 4A: Selection of a Preferred Site – Biology"

N

Scale Bar 500 0 500
250 0 250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 **Figure 3**

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated into Section 4.2.2.

4.2.1 SPECIES LIST:

A total of 134 plant species has been recorded on Site LF-3C. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Eight natural vegetation associations are present on Site LF-3C. Cropland and unclassified land are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under four major cover type headings:

Forest

The dominant forest cover represented on the site is upland deciduous with an area of 18 hectares. It occurs in conjunction with lowland deciduous woods in three main blocks on the site. The pattern of distribution of these associations is strongly influenced by the existing slough-ridge topography. The lowland deciduous component occupies 13 hectares.

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE LF-3C

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Deciduous Forest	18
Lowland Deciduous Forest	13
Upland Coniferous Forest	1
Lowland Shrub Thicket	2
Upland Shrub Thicket	1
Recently Disturbed Field	34
Old Field	6
Marsh	32
Other	
Cropland	144
Unclassified	8
TOTAL	259

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting all other cover type areas from the total site area.

An upland coniferous plantation is located near the southeast corner of the site and occupies less than 1 hectare.

The upland deciduous forest is dominated by Red Oak (*Quercus rubra*), White Oak (*Quercus alba*), Shagbark Hickory (*Carya ovata*), Sugar Maple (*Acer saccharum*) and American Beech (*Fagus grandifolia*).

The common deciduous lowland component present is dominated by Red Maple (*Acer rubrum*), Black Ash (*Fraxinus nigra*), American Elm (*Ulmus americana*) and Swamp White Oak.

The small coniferous plantation present is dominated by immature evergreens.

Thicket

Both upland and lowland thicket areas are present on the site. A small block of upland thicket occupying 1 hectare is located in the northeast corner of the site. A larger area of lowland thicket (2 ha), is scattered in patches throughout. The patches are confined to the wet-mesic and wet sloughs, primarily external but connected to wooded blocks.

There appear to be three main types of lowland thicket on the site, based upon the dominant shrubs. They are Buttonbush (*Cephalanthus occidentalis*)/Speckled Alder (*Alnus incana* ssp. *rugosa*) dominated, Gray Dogwood (*Cornus racemosa*) dominated and Narrow-leaved Meadowsweet (*Spirea alba*) dominated. All occur in very small patches and ribbons.

The patch of upland thicket is dominated by Hawthorn (Crataegus macrosperma).

Marsh

A major band of marsh is associated with Beaver Creek, which flows across the northern half of the site. Other marsh areas are associated with sloughs internal and external to the forested land discussed. Figure 3 illustrates the distinct ribbon pattern assumed by this vegetation association. The widely scattered marsh habitat occupies 32 hectares.

Much of the marsh vegetation is dominated by robust emergents such as Narrow-leaved Cattail and Reed Canary Grass. Other marsh ribbons are dominated by narrow-leaved emergents (e.g. Rice Cut Grass), broad-leaved emergents (e.g. Arrowhead, Sagittaria latifolia) and rooted floating plants (e.g. Swamp Smartweed, Polygonum coccineum).

Field

The site contains a mosaic of old field, recently disturbed field and cropland.

The old field, occupying 6 hectares, is scattered in seven patches across the site, being associated primarily with the Beaver Creek and woodland edges.

Recently disturbed field, occupying 34 hectares, is scattered in larger blocks across the site.

The old field present on the site is dominated by non-weedy herbaceous vegetation, while the recently disturbed field is dominated by weedy species such as Yarrow (Achillea millefolium) and Chickory (Cichorium intybus).

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS:

Special associaations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distribution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

No special vegetation associations or SEUs were recorded on Site LF-3C. The slough-ridge topography and associated vegetation which occur on Site LF-3C are typical features on the Haldimand Clay Plain. Pockets of mature woods similar to those noted on the site occur in other locations in Niagara Region.

4.3 FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Sixty-two bird species, 14 mammal species, five reptile and amphibian species and one fish species have been recorded on Site LF-3C. Master species lists are presented in Tables 6 through 9.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

Beaver Creek is the major water course on the site. It passes through the northern portion of Candidate Site LF-3C. This is a slow flowing, warm water stream which contains water year-round.

An old oxbow of the Welland River exists on the southern edge of the site. A number of channels which contain water seasonally, drain the site.

There are a number of sloughs in certain woodlots which apparently contain water year round.

There are several small farm ponds associated with buildings on the site. These are not thought to represent significant aquatic habitat.

All of these water bodies likely provide habitat for amphibians and certain ones, such as Beaver Creek and the unnamed oxbow, provide aquatic bird, mammal, fish and turtle habitat. Northern Pike (Esox lucius) is the major game fish species known to occur in the larger streams.

4.3.3 EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Eight natural vegetation cover types occur on Site LF-3C. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site LF-3C cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

Over half of Site LF-3C (149 ha) is currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer (Odocoileus virginianus) and granivorous birds) as food sources, but rarely support nesting birds. Recently disturbed fields may provide suitable breeding habitat for a number of ground-nesting birds (e.g. Bobolink (Dolichonyx oryzivorus) and Eastern Meadowlark (Sturnella magna)) and small rodents (e.g. Meadow Vole (Microtus pennsylvanicus) and Deer Mouse (Peromyscus maniculatus)). However, this vegetation cover type is most important as terrestrial wildlife habitat in later stages of plant succession. Old field habitat, while poorly represented on Site LF-3C (approximately 6 ha), is a potential breeding area for both ground and shrub-nesting birds such as Eastern Kingbird (Tyrannus tyrannus), Gray Catbird (Dumetella carolinensis), Yellow Warbler (Dendroica petechia), Song Sparrow (Melospiza melodia), and American Goldfinch (Carduelis tristis).

Mammals associated with this habitat type include Woodchuck (Marmota monax) and Eastern Cottontail (Sylvilagus floridanus). The four species of snakes recorded on Site LF-3C (Table 8) are all typically found in fields.

Forests

The interface between field and forest habitats is occupied by "edge" species. Although narrow, the "edge" ecotone typically provides the greatest diversity of vegetation types and thus supports a correspondingly high number of wildlife species (Taylor and Taylor 1979).

The breeding bird community associated with "edge" species on Site LF-3C is an overlapping one, comprised of both field and forest dwellers. Woodlot margins are also favoured by Coyotes, Red Fox (Vulpes vulpes) and deer.

The structure and diversity of the breeding bird community associated with the mesic oak woodlands on Site LF-3C is strongly influenced by the vertical complexity of the vegetation. Much of these woodlots have a relatively simple vegetation structure and do not contain a high diversity of plant species.

The presence of upland and lowland deciduous woods interrupted by ribbons of marsh vegetation, however, adds complexity to these units. Much of the overstory stratum is comprised of mature trees which have formed a closed canopy. At this successional stage the density of understory growth is diminished.

Lowland deciduous woods are dominated by pole-sized material with a moderately dense understory component. The understory reaches its densest form within the marsh-dominated sloughs and in the narrow edge component adjacent to the sloughs.

The avian niches provided by mature mesic oak forests are primarily suited for occupation by insectivorous species. Canopy dwellers such as Red-eyed Vireos (*Vireo olivaceus*), Yellow-throated Vireos (*Vireo flavifrons*), Blue-gray Gnatcatchers (*Polioptila caerulea*) and Cerulean Warblers (*Dendroica cerulea*) may be present as nesting species. The absence of shrub cover throughout the more mature wooded areas eliminates some ground feeders and understory foliage gleaners.

Hollow trees provide den sites for Opossums (*Didelphis virginiana*), Raccoons (*Procyon lotor*) and squirrels.

Deer movements among the woods on-site and to off-site woodlots have been observed by area residents. Certain bird species undoubtedly move between these woods also.

Marsh

Wetland vegetation along the margins of Beaver Creek support populations of aquatic mammals such as Muskrats (*Ondatra zibethicus*) and American Minks (*Mustela vison*). Nesting birds associated with this marsh habitat include Red-winged Blackbirds (*Agelaius phoeniceus*) and Common Yellowthroats (*Geothlypis trichas*). Suitable breeding habitat for toads, frogs and turtles is also present.

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds.

Spring pike runs have been reported in Beaver Creek and an unnamed backwater of the Welland River. Reaches of streams which may support pike spawning are indicated in Figure 3. Locations of spawning and numbers of fish involved are not known. Pike spawning associated with Site LF-3C is of local significance, as this activity occurs in many streams which drain to the Welland River.

4.4 RARE SPECIES

4.4.1 INTRODUCTION:

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation. These are indicated in Tables 5 through 9 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed in Sections 2.2 and 7.1 of this technical appendix and in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology"

To make information presentation more logical, indicators of rare species are not used to divide the discussion. Rather, rare species discussions are organized by life form (animals and plants) and species. Each indicator is addressed within each species discussion.

The approximate locations of rare species occurring on the site are mapped in Figure 3 at an original scale of 1:5,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species where, for example, several individuals are found in close proximity to one another. Information concerning actual numbers of individuals of rare species and their on-site distribution is presented later in this technical appendix and in Table 2.

However, it should be emphasized that existing rare species data are based on preliminary investigations. Further on-site field work could result in an increase in both the numbers and individuals of rare species.

4.4.2 RARE ANIMAL SPECIES:

Two animal species which have been reported from Site LF-3C are considered to be rare. These are the Eastern Bluebird (*Sialia sialis*) and the Opossum. Approximate on-site locations are noted in Figure 3.

Eastern Bluebird

Bluebirds are reported as occurring on Site LF-3C (Vaughan and Vaughan 1984; Ullman, *pers*. *comm*. 1984). Although these observations were made during the summer months, concrete evidence of breeding is presently lacking.

Throughout much of its range, the Eastern Bluebird has experienced a pronounced population decline in recent years (Tate and Tate 1982). The species was recently added to the list of rare Canadian taxa by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Muir 1984).

Sheppard (1970) describes the bluebird as "formerly a reasonably common summer resident" which is now "quite a rarity" in localities where it was once prevalent. This trend is corroborated by preliminary (1981-1983) results of the Ontario Breeding Bird Atlas Project. As of 1983, no breeding evidence for the Eastern Bluebird was recorded in any of the 10 km square units containing or adjacent to Site LF-3C (Ontario Breeding Bird Atlas 1984).

Opossum

There are several recent reports of Opossum from Site LF-3C (Vaughan, *pers. comm.* 1984; Cosby, *pers. comm.* 1984; Vaughan *et al.* 1984).

The present distribution of this species in southern Ontario is confined to the north shore of Lake Erie, the Niagara Peninsula and the Thousand Island region (van Zyll de Jong 1983). Of sporadic occurrence, Opossums appear to have invaded Ontario from Michigan and New York (Peterson and Downing 1956). They are almost exclusively restricted to the Deciduous Forest Region (Rowe 1972), where they are generally able to withstand moderate winter conditions.

Although rare throughout much of southern Ontario, at present this marsupial appears to be locally common in Niagara R.M. The regional status of the Opossum may change however, as populations tend to undergo rapid fluctuations in response to changing climatic conditions (Hamilton 1958).

4.4.3 RARE PLANT SPECIES:

Four rare plant species are reported from Site LF-3C. These are:

Golden Seal	*Hydrastis canadensis*
Pin Oak	*Quercus palustris*
Tupelo	*Nyssa sylvatica*
Southern Arrowwood	*Viburnum recognitum*

Relative population sizes and distribution patterns of rare plant species on Site LF-3C were determined from field observations conducted by Gartner Lee Associates Limited (GLAL) and an additional source (de Boer, *pers. comm.* 1984). Numbers of individuals were noted within field study plots. These totals were supplemented by observations made between sampling stations. Known localities of rare plants are plotted on Figure 3.

Golden Seal

The exact location and population data for this species are unknown. It was reported from the north-central portion of the site, associated with Beaver Creek (deBoer, *pers. comm.* 1985).

Argus and Keddy (undated) consider the species to be rare in Ontario and Canada, due partly to the loss of appropriate wooded habitat and a past history of harvesting for medicinal use.

No stations for Golden Seal are reported in the Niagara Peninsula by Argus and Keddy (undated) although it has been reported from the Niagara Glen area of the Niagara Parks system (Hamilton 1943; Yaki 1970).

Pin Oak

One specimen, approximately 35 cm diameter at breast height (dbh), were recorded during GLAL field work. Although Argus and White (1977) consider the Pin Oak to be rare in Ontario and Canada, Zander and Pierce (1979) do not consider it regionally rare in the Niagara Frontier Region.

Tupelo

Found only twice on Site LF-3C, Tupelo prefers lowland sites and the margins of ponds. This species also appears to have a very limited on-site distribution. One specimen with a dbh of approximately 25 cm was recorded at one station. A second individual was noted nearby, but outside the study plot.

While designated rare in Ontario and Canada (Argus and White 1977), it is not considered to be rare in the Niagara Frontier Region according to Zander and Pierce (1979).

Southern Arrow-wood

Southern Arrow-wood appears to be widely distributed in the wet, wooded areas on the site, where it often associates with Swamp White Oak. A total of five specimens were recorded; one at each of five sampling locations.

Although considered rare in Ontario and Canada (Argus and Keddy, undated), Southern Arrow-wood is not accorded rare status in the Niagara Frontier Region (Zander and Pierce 1979).

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered are: forestry, trapping, hunting and fishing. Resource use has been identified as a biological factor, the rationale for which is provided in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.5.1 FORESTRY:

Forestry potential (Figure 3) refers to wooded areas which could be commercially logged for sawlogs, veneer logs and fuelwood.

On-site assessments of forestry potential were made by GLAL on the basis of the following criteria: size of woodlot, species composition, age and size of trees, accessibility and aspect. Deciduous upland forests generally have a greater potential than deciduous lowland forests, although both cover types are considered.

Additional information pertaining to the forestry potential of Site LF-3C was provided by the Ontario Ministry of Natural Resources (OMNR) and questionnaire responses.

The 31 hectares of deciduous woods on the site are composed of a mixture of pole-sized trees and more mature specimens. In particular, the eastern woodlot contains several very mature White Oaks, each with a diameter at breast height (dbh) of greater than one metre.

The major forest products taken from Site LF-3C are sawlogs and fuelwood (OMNR 1984a). A commercial logging operation was carried out in the westernmost woodlot in July of 1984 (Douma, pers. comm. 1984). Cutting was concentrated in upland deciduous areas and involved Red and White Oaks, Sugar Maple and Shagbark Hickory. The moderately heavy selective harvest for veneer logs created several large openings in the forest canopy.

Timber cruising on a portion of the easternmost woodlot was carried out by the OMNR in July 1984 (Peaire, pers. comm. 1984). Selective logging of oaks may take place on this site in future.

A number of landowners/tenants presently residing on Site LF-3C cut fuelwood for their personal consumption (Cosby, pers. comm. 1984; Davis, P., pers. comm. 1984; Vaughan, pers. comm. 1984). Maple syrup extraction (Peaire, pers. comm. 1984; Vaughan, pers. comm. 1984) and harvesting of fruit trees (Davis, P., pers. comm. 1984) are additional forestry related activities engaged in on Site LF-3C.

Within a regional context, forestry is not a significant resource use on Site LF-3C.

4.5.2 TRAPPING:

Licenses have been granted to five trappers working on Site LF-3C (OMNR 1984d). Muskrat is the most commonly harvested species, followed by Raccoon. Coyote and Red Fox are occasionally captured but neither comprise a significant portion of the total harvest (OMNR 1984d).

The majority of the Muskrats are trapped along Beaver Creek. In 1983-84 a total of 115 Muskrats and 22 Raccoons were trapped on Site LF-3C (OMNR 1984d).

Trapping is important for maintaining fur-bearer populations which might otherwise experience erratic fluctuations. On Site LF-3C it appears to have had a positive effect on local muskrat populations. According to one trapper (Merritt, *pers. comm.* 1984), the annual catch in this area has actually improved by one-third to one-half since 1940.

4.5.3 HUNTING:

Site LF-3C is decribed as a "good general deer hunting area" (OMNR 1984a). This sentiment is not corroborated by landowner questionnaire results. Few landowners actually hunt on their own properties, and several others do not allow hunters access to the site. The most recent (1982) harvest statistics available do not indicate whether any of the deer killed in the Township of West Lincoln originated from Site LF-3C (OMNR 1984d).

Waterfowl and upland game hunting also occur on Site LF-3C (McPherson, pers. comm. 1984) but appear to be of minor importance.

In general, hunting activity is not a significant biological resource use on the site.

4.5.4 FISHING:

Fishing activity on Site LF-3C is light due to the poor habitat quality of Beaver Creek (OMNR 1984a). Spear fishing for Northern Pike takes place during the spring (Cosby, pers. comm. 1984; Krick, pers. comm. 1984). Although there are no data to quantify the significance of Beaver Creek as a fishery resource, it is believed that a small angling harvest of pike occurs on those portions of the creek which exhibit significant discharge rates (OMNR 1984d).

Although a bait fishing license has been issued for the area covering Site LF-3C (OMNR 1984d), fishing appears to be restricted to adjacent water courses in the site vicinity and does not yield a significant harvest.

4.6 SUMMARY-SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to present the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s)- Biology".

Table 2 Summary Site Biological Resources LF-3C

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURCE USE			
NAME	NO. OF INDIVIDUALS	DISTRIBUTION	SPECIES LIST	AQUATIC HABITAT	TERR. WILD. HABITAT	SPECIAL HABITAT	SPECIES LIST	AREA NAT. VEGETAT.	NO. OF COVER TYPES	SPECIAL ASSOC.	FORESTRY	TRAPPING	HUNTING	FISHING
• Eastern Bluebird	2 or more reported	southeast and northwest corners of site	• 62 bird species • 14 mammal species • 5 reptile and amphibian species • 1 fish species	• Beaver Creek • sloughs • drainage channels • farm ponds • old oxbow of Welland River (unnamed)	• 8 natural vegetation cover types • less than 35 ha of forest • some thicket, marsh and old field habitat • habitat for forest, edge, wetland and field communities	• locally significant pike spawning in Beaver Creek and in an unnamed backwater of the Welland River	• 134 plant species	• Upland Deciduous Forest 18 ha • Lowland Deciduous Forest 13 ha • Lowland Conifer. Forest 1 ha • Lowland Shrub Thicket 2 ha • Upland Shrub Thicket 1 ha • Recently Disturbed Field 34 ha • Old Field 6 ha • Marsh 32 ha	• 8 natural vegetation cover types, see list to left	• None	• sawlog and fuelwood harvest • maple syrup, hickory nut collection	• muskrats and raccoons primarily • five trappers according to MNR	• minor activity	• pike spearing of local significance
• Opossum	2 or more reported	eastern side of site												
• Pin Oak	1 found	woodlot on eastern side of site												
• Tupelo	2 found	woodlot on eastern side of site												
• Southern Arrow-wood	5 found	woodlot on eastern side of site, lowland areas												
• Golden Seal	1 or more reported	north-central portion of site along Beaver Creek												

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

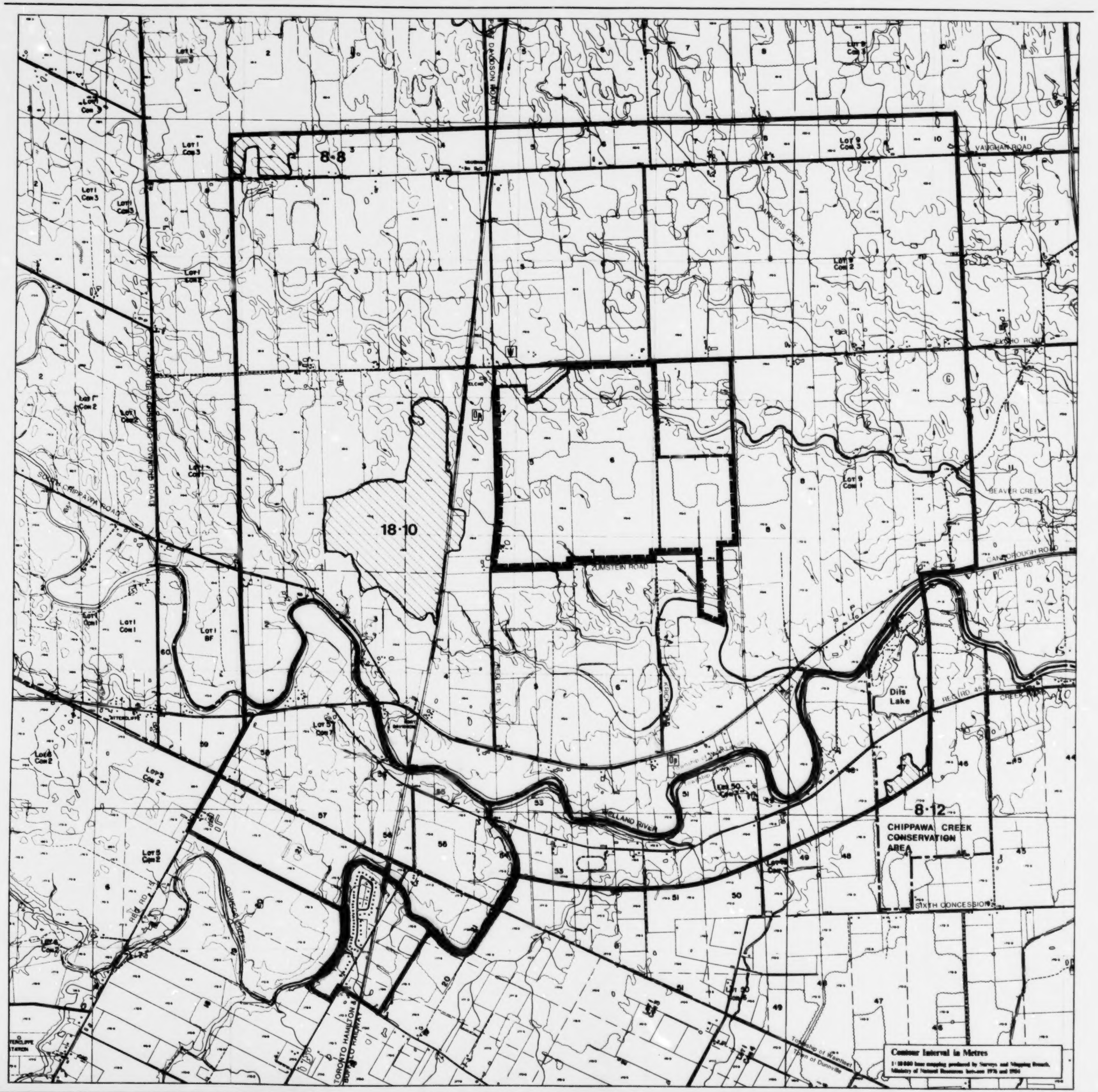
5.1 INTRODUCTION

Site vicinity is defined as the area which lies outside Site LF-3C within approximately a 2.0 km radius of the acquisition boundary. The LF-3C site vicinity boundary is delineated in Figure 4 and referred to as the "Site Vicinity Study Area Boundary".

A total of 436 plant species has been recorded in the site vicinity (Table 5). All but one of the 50 bird species reported from the site vicinity are permanent or summer residents which possibly breed in the area (Ontario Breeding Bird Atlas 1984; Table 6). An additional 14 species of mammals, eight species of amphibians and reptiles and 20 species of fish are known to occur in the site vicinity (Tables 7 through 9 respectively).

In general, the pattern of vegetation cover types found throughout the site vicinity is similar to that which exists on the site itself.

Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations, and rare species.


8·8
18·10
8·12
DAWSON ROAD
VAUGHAN ROAD
ENSIGN ROAD
BEAVER CREEK
CANBOROUGH ROAD
ZUMSTEIN ROAD
SOUTH CHIPPAWA ROAD
WELLAND RIVER
CREEK ROAD
SIXTH CONCESSION
CHIPPAWA CREEK CONSERVATION AREA
Dils Lake
TORONTO HAMILTON & BUFFALO RAILWAY
Lot 1 Con 1
Lot 1 BF
Contour Interval in Metres
1:10 000 base mapping produced by Surveys and Mapping Branch, Ministry of Natural Resources between [illegible]

Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS

Op Opossum

W Whip-poor-will

PLANTS

Ⓖ Ginseng

Significant Environmental Units

▨ ESAs, ANSIs and AIBRs

13·3 — Unit number — Candidate area number

Significant Fish and Wildlife Features

〰 Pike Spawning Areas

☐ Important Waterfowl Production Areas

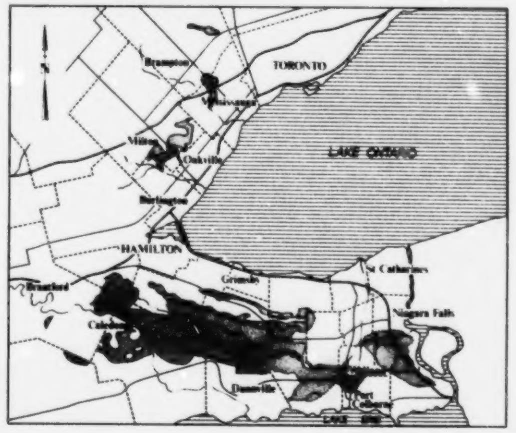
▬ ▬ Proposed Acquisition Boundary

▬▬ Phase 3B Acquisition Boundary

▬▬ Site Vicinity Study Area Boundary

Key Map: **LF-3 Central**

Lots 5, 6 and 7; Concession 1; Part of Lot 7; Broken Front Concession; Township of West Lincoln; formerly in the Township of Gainsborough


N
Brampton
TORONTO
Mississauga
LAKE ONTARIO
Milton
Oakville
Burlington
HAMILTON
Brantford
Grimsby
St Catharines
Niagara Falls
Caledonia
Dunnville

1000 feet 0 1000
500 metres 0 500

EXISTING BIOLOGICAL CONDITIONS, PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

September 1985 FIGURE 4

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definitions of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The entire area of one SEU and portions of two others occur within the LF-3C site vicinity (Figure 4). The area of the one natural vegetation cover type represented in SEUs is noted in Table 3.

The southern end of the Vaughan Forest (SEU 8-8) occupies the northwestern corner of the site vicinity. It is situated exactly 2.0 km from Site LF-3C at its closest point. The microtopography of this 40 ha woodlot is typical of the poorly drained, slough-ridge pattern found on the site. The Vaughan Forest fulfills two of the ESA criteria established by Brady et al. (1980a), the presence of rare plant species and a biotic community of high quality.

The southeast corner of the site vicinity is occupied by a small portion of the Chippawa Creek Conservation and Wildlife Management Area (SEU 8-12). This 300 ha site, situated approximately 1.5 km from Site LF-3C at its closest point, is comprised of a large contiguous hardwood forest interspersed with marshland and old fields. The Chippawa Creek Conservation and Wildlife Management Area has been designated as an ESA by Brady et al. (1980a). The

TABLE 3. AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, LF-3C.

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
SEU	
Deciduous Forest	100
Other	
Deciduous Forest	205
Coniferous Forest	<1
Mixed Forest	9
Thicket	<1
Wetland	48
Successional Field	2
TOTAL	366

* Areas are approximate and are rounded to whole numbers.

area functions as a water storage area, contains a diverse number of habitats, supports rare plant species, represents a large unbroken forest tract, and is an established Conservation and Wildlife Management Area.

The Southwestern Elcho Forest (SEU 18-10) has been identified as a "locally significant" ANSI (OMNR 1984e). It is situated 240 m west of Site LF-3C at its closest point. This 70 ha maple-oak woodland provides a good example of the slough-ridge topography common to this area. A high diversity of slough-associated vegetation communities exists in this ANSI, although "no significant biota were noted" (Macdonald 1980). Evidence of tree cutting, agriculture and trampling was apparent.

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

Fish Spawning Areas

As noted in Section 4.3.4, Beaver Creek and an unnamed backwater of the Welland River support a locally significant pike run. Beaver Creek flows from west to east through the site vicinity and dissects the northern portion of Site LF-3C (Figure 4). An oxbow of the unnamed backwater flows through the southernmost portion of the site (Figure 4).

The Welland River flows through the site vicinity from west to east (Figure 4). It is situated 750 m from Site LF-3C at its closest point. The Welland River supports populations of sport and coarse fish and the Ontario Ministry of Natural Resources (1984d) indicates that pike spawning is known to occur along the river throughout the site vicinity. Numbers of pike spawning at specific locations are not known.

In the Niagara District Land Use Guidelines (OMNR 1983c), the Welland River south of Site LF-3C is not shown as an important fishery. However, the presence of pike spawning in the Welland River in the LF-3C site vicinity is of local fisheries significance.

Dils Lake, located within the Chippawa Creek Conservation Area, has been rehabilitated to provide pike spawning and nursery areas (OMNR 1983e; Miller 1984). This creek is approximately 1.4 km from the site boundary.

Waterfowl Production Areas

The margins of the Welland River and their associated wetlands, 750 m from the site, serve as waterfowl production areas (OMNR 1984d; Figure 4). However, these waterfowl production areas are considered to be of only "average significance" on a regional level (OMNR 1984b).

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within the site vicinity which is not designated as SEU. Six natural vegetation associations are represented. The approximate area of each vegetation association is indicated in Table 3. In general, the site vicinity vegetation is of similar structure and composition to that studied on Site LF-3C.

Forest

A mix of deciduous, coniferous and mixed forest is present in the site vicinity. The deciduous woods represent the largest component of natural vegetation in the site vicinity, covering approximately 200 hectares.

The woods are fragmented and widely scattered blocks varying from less than one to about 20 hectares in size.

A small, isolated parcel of coniferous woods (less than 1 ha in area) is present and almost ten hectares of mixed woods are scattered in three patches adjacent to deciduous woods.

Thicket

A minor thicket component (less than 1 ha) is present within a deciduous woodlot.

Wetland

Wetland habitats occupy approximately 48 hectares, primarily along the margins of Beaver and Parkers Creeks.

Successional Field

This vegetation association, situated along the unnamed oxbow of the Welland River, involves nearly 2 hectares of area.

Since no field work was conducted in the site vicinity, the significance of site vicinity natural vegetation units as wildlife habitat can only be speculated upon. Several of the woodlots found in the site vicinity are substantially larger in area than those found on the site itself and may harbour a greater diversity of wildlife. Although highly fragmented, the forested areas in the northern portion of the site vicinity may collectively function as a travel corridor for wildlife, linking larger wooded tracts.

5.5 RARE SPECIES

Where known, the approximate locations of rare species occurring in the site vicinity are mapped in Figure 4 at an original scale of 1:10,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species, where, for example, several individuals are found in close proximity to one another. For information concerning actual numbers of individuals of rare species and their on-site distribution, the reader is referred to the accompanying text of Section 5.5.

5.5.1 RARE ANIMAL SPECIES:

One rare bird and one rare mammal have been recorded in the site vicinity.

Whip-poor-will (Caprimulgus vociferus)

Black's (1984) report of a singing male Whip-poor-will just north of the junction of Elcho Road and Regional Road 16, while suggestive of territoriality, may refer to a late spring migrant. This species should be considered regionally rare if breeding is confirmed.

Peck and James (1983) do not cite any Whip-poor-will nest records from Niagara R.M. and believe that the species has become "quite scarce" in agricultural areas where much of the original forest cover has been removed. According to Sheppard (1970) it is apparently still found sparingly in the Wainfleet Marsh area during breeding season.

Opossum

Opossums have been reported from the site vicinity (Krahne, *pers. comm.* 1984a, 1984b; Zantingh, *pers. comm.* 1984). For the provincial and regional status of this mammal species the reader is referred to Section 4.4.2 of this technical appendix.

5.5.2 RARE PLANT SPECIES:

Seventeen rare plant species have been recorded in the site vicinity. All but one were recorded by Putnam (1975) within the Chippawa Creek Conservation Area.

Three rare trees have been recorded, two of which are typically found in wet and wet-mesic habitats: These are:

Tupelo	*Nyssa sylvatica*
Tulip Tree	*Liriodendron tulipifera*

Both are considered to be rare in Ontario and Canada by Argus and White (1977), however neither are designated as rare in the Niagara Frontier Region (Zander and Pierce 1979).

The third rare tree, Red Pine (*Pinus resinosa*), is considered rare in the Niagara Frontier Region (Zander and

Pierce 1979). The Chippawa Creek record probably refers to a planted specimen. This species has a more northerly distribution and is common in drier habitats throughout the Great Lakes - St. Lawrence Forest Region (Rowe 1972).

Two rare shrubs were recorded by Putnam (1975), one of which, Southern Arrow-wood, is associated with wet habitats. This species is considered rare in Ontario and Canada (Argus and Keddy, undated). It is not considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

The remaining shrub, Hazelnut (Corylus americana), is characteristic of well-drained, drier sites. Hazelnut is designated as rare in the Niagara Frontier Region (Zander and Pierce 1979).

Eleven rare species of ground flora were recorded in the site vicinity by Putnam (1975). The nine listed below are associated with wet and wet-mesic habitats:

Pondweed	Potamogeton foliosus
Sedge	Carex alopecoidea
Sedge	C. grayi
Narrow-panicled Rush	Juncus acuminatus
Water Dock	Rumex orbiculatus

Green Water-milfoil	_Myriophyllum verticillatum_
Hedge Nettle	_Stachys hispida_
Spray Aster	_Aster pilosus_
Wild Yam	_Dioscorea villosa_

Spray Aster is considered rare in the Niagara Frontier Region (Zander and Pierce 1979). The species was recently delisted from the Atlas of Rare Vascular Plants in Ontario (Argus and White 1983) and has been taxonomically lumped with a more common variety (Semple, _pers_. _comm_. 1984).

Wild Yam is considered rare in Ontario and Canada (Argus and White 1977), but not regionally rare (Zander and Pierce 1979). Narrow-panicled Rush is considered rare by both sources, provincial and regional. The remaining seven species are considered rare in the Niagara Frontier Region by Zander and Pierce (1979).

Two species of ground flora are more characteristic of drier, well drained sites. These are:

Little Blue-eyed Grass	_Sisyrinchium montanum_
Short-styled Snakeroot	_Sanicula canadensis_

Short-styled Snakeroot is considered rare in Ontario and Canada (Argus and White 1977). Little Blue-eyed Grass is considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

An additional rare species, Ginseng (Panax quinquefolium), was reported from a woodlot in the northeastern corner of the site vicinity (Chippawa Watershed Association, Inc. 1985; Figure 4). This plant was not recorded by Putnam (1975). Ginseng is rare in Canada and Ontario (Argus and Keddy, undated) but is not considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information, as summarized in Table 4, provides background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources LF-3C

FACTORS AND INDICATORS

SIGNIFICANT ENVIRONMENTAL UNITS			FISH & WILDLIFE FEATURES OF SIGNIFICANCE		OTHER NATURAL VEGETATION	RARE SPECIES
SEUS	CRITERIA FOR DESIGNATION	DISTANCE TO SITE	FEATURES	DISTANCE TO SITE		
• 8-8 • Vaughan Forest • Brady ESA Study	• rare plant species • biotic community of high quality	2 km	• locally significant pike spawning - Beaver Creek - unnamed backwater of Welland River - Welland River	• flows from site into site vicinity • flows from site into site vicinity • 750 m	• Deciduous Forest 206 ha • Coniferous Forest <1 ha • Mixed Forest 9 ha • Thicket <1 ha • Wetland 48 ha • Successional Field 2 ha	Animals • Whip-poor-will • Opossum Plants • Trees: - Tupelo - Tulip Tree - Red Pine • Shrubs: - Southern Arrow-wood - Hazelnut • Ground Flora: - Potamogeton foliosus - Pondweed - Carex alopecoidea - Sedge - C. grayi - Sedge - Narrow-panicled Rush - Water Dock - Green Water - milfoil - Hedge Nettle - Spray Aster - Wild Yam - Little Blue-eyed Grass - Short-styled Snakeroot - Ginseng
•18-10 • Southwestern Elcho Forest • MNR ANSI • locally significant	• good example of slough-ridge topography • high diversity of slough vegetation	250 m	• Waterfowl production area of "average significance" - Welland River (OMNR 1984b)	• 750 m		
• 8-12 • Chippawa Creek Conservation and Wildlife Management Area • Brady ESA Study	• water storage area • diversity of habitats • rare plant species • large forest tract • established Conservation and Wildlife Management Area	1.5 km				

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7.0 SPECIES LIST

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 9) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins et al. 1982) and fish (Scott and Crossman 1973).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 9. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined; these are sources 15, 16, 45, 46, and 47.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", "Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

The most current source of information concerning plant status and distribution in Niagara Region is _Flora of the Niagara Frontier Region_ (Zander and Pierce 1979). Although prepared in New York State, the study area includes Niagara Region in Ontario. It draws upon Ontario literature and provides an accurate reflection of regional plant status.

Other background reports examined included works by Zenkert (1934) and Zander (1976) for the Niagara Frontier Region. Environmentally Sensitive Areas reports by Brady _et al_. (1980a), Ecologistics Limited (1976) and Eagles _et al_. (1980) provided additional regional perspectives for plant species distribution and status. _The Vascular Plants of Norfolk County_ (Landon 1960) provided regional data for an adjacent area.

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reports where applicable.

Frequency and relative abundance standards are assigned to Ontario birds by James _et al_. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

Two annotated lists of the regional avifauna were relied upon heavily when determining the status of birds in the Niagara Peninsula. The geographical scope of Beardslee and Mitchell's (1965) account encompasses a large portion of neighbouring New York State, while Sheppard's (1970) treatment is confined to the Ontario side. Previous published lists (Sheppard et al. 1936; Sheppard 1939) contain references to the historical status of selected species.

In assigning status, Beardslee and Mitchell (1965) adopt the criteria and terms established by the Federation of New York State Bird Clubs in 1954. These differ somewhat from the criteria used by James et al. (976) to determine status on a provincial level. Terms used by Sheppard (1970) to describe abundance and frequency of occurrence are not defined.

More recent information on the status of breeding birds in the Niagara Region was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April, 1984, 20 species of mammals have been designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not addressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammal fauna of the Regional Municipality of Niagara. Information supplied by local naturalists and recognized authorities in the field of mammalogy was largely relied upon to determine the regional status of a particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and South Wellington Counties were also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from the Niagara Region, however they do not assign status. A survey of the amphibians and reptiles of the Niagara Escarpment Planning Area (Campbell 1976) also includes references to Niagara.

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister *et al*. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species is presently protected in Ontario by "Endangered" species legislation (Ontario Government 1971; OMNR 1977). The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disproportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitative definitions of rarity could be proposed with a considerable degree of confidence.

However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of Guelph, and the National Museum of Natural Sciences in Ottawa, were ocnsulted on a number of occasions.

In cases where wildlife data were lacking, lengthy discussions were held with appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE LF-3C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LYCOPODIACEAE	CLUBMOSS FAMILY		
Lycopodium obscurum L.	Ground-pine		27
EQUISETACEAE	HORSETAIL FAMILY		
Equisetum arvense L.	Field Horsetail		27
E. sylvaticum L.	Wood Horsetail		27
OPHIOGLOSSACEAE	ADDER'S - TONGUE FAMILY		
Botrychium dissectum Spreng.	Dissected Grape Fern		27
B. virginianum (L.) Sw.	Rattlesnake Fern		27
OSMUNDACEAE	ROYAL FERN FAMILY		
Osmunda cinnamomea L.	Cinnamon Fern	50, 16	21, 27, 49
O. claytoniana L.	Interrupted Fern		17
O. regalis L.	Royal Fern	16	21, 27, 49
DENNSTAEDTIACEAE	BRACKEN FAMILY		
Pteridium aquilinum (L.) Kuhn	Bracken Fern	16	27
ADIANTACEAE	MAIDENHAIR FERN FAMILY		
Adiantum pedatum L.	Northern Maidenhair Fern		27

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
ASPLENIACEAE	SPLEENWORT FAMILY		
Matteuccia struthiopteris (L.) Todaro	Ostrich Fern		27
Onoclea sensibilis L.	Sensitive Fern	50,16	27
Athyrium felix-femina L.	Lady Fern		21,27,49
Dryopteris intermedia (Muhl.) Gray	American Shield-fern		27
D. marginalis (L.) A. Gray	Evergreen Wood-fern		27
D. novaboracensis L.	New York Fern		27
D. spinulosa (Muell.) Kuntze	Spinulose Shield-fern		27
Polystichum acrostichoides (Michx.) Schott	Christmas Fern		27
THELYPTERIDACEAE	BEECH FERN FAMILY		
Thelypteris palustris (Salisb.) Schott	Marsh Fern	16	27
PINACEAE	PINE FAMILY		
Pinus banksiana Lam.	Jack Pine	16	
P. resinosa Ait.*	Red Pine		25,21,17, 49
P. strobus L.	White Pine	16, 15,14,50	25,21, 48,49, 53
Tsuga canadensis (L.) Carr.	Eastern Hemlock		25
CUPRESSACEAE	CYPRESS FAMILY		
Juniperus virginiana L.	Eastern Red Cedar		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
TYPHACEAE	CATTAIL FAMILY		
Typha angustifolia L.	Narrow-leaved Cattail	16	27
T. latifolia L.	Cattail	16	27
SPARGANIACEAE	BUR-REED FAMILY		
Sparganium americanum Nutt.	Nuttall's Bur-reed		27
S. eurycarpum Engelm.	Giant Bur-reed		27
ZOSTERACEAE	PONDWEED FAMILY		
Potamogeton crispus L.	Curly-leaved Pondweed		27
P. foliosus Raf. *	Pondweed		27
P. illinoense Morong.	Pondweed		27
P. natans L.	Pondweed		27
P. pectinatus L.	Sago Pondweed		27
P. zosteriformis Fern.	Flat-stemmed Pondweed		27
NAJADACEAE	NAIAD FAMILY		
Najas flexilis (Willd.) R. & S.	Bushy Naiad		27
ALISMATACEAE	WATER-PLANTAIN FAMILY		
Alisma plantago-aquatica L.	Water-plantain	16	
Sagittaria latifolia Willd.	Arrowhead	16	
HYDROCHARITACEAE	FROG'S-BIT FAMILY		
Elodea canadensis Michx.	Elodea		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
POACEAE	GRASS FAMILY		
Bromus commutatus Schrad.	Hairy Chess		27
B. erectus Huds.	Upright Brome Grass		27
B. inermis Leyss.	Smooth Brome Grass		27
Festuca obtusa Biehl.	Nodding Fescue		27
F. pratensis Huds.	Meadow Fescue		27
F. rubra L.	Red Fescue		27
Glyceria grandis S. Wats.	Tall Manna Grass		27
G. septentrionalis A.S. Hitchc.	Eastern Manna Grass		27
G. striata (Lam.) A. S. Hitchc.	Fowl Manna Grass		27
Poa annua L.	Annual Blue Grass		27
P. compressa L.	Canada Blue Grass		27
P. palustris L.	Fowl Meadow Grass		27
P. pratensis L.	Kentucky Blue Grass		27
Dactylis glomerata L.	Orchard Grass		27
Agropyron repens (L.) Beauv.	Quack Grass		27
Elymus hystrix L.	Bottle-brush Grass	16	27
E. virginicus L.	Virginia Wild-rye	16	27
Hordeum jubatum L.	Foxtail Barley		27
Sphenopholis intermedia (Rydb.) Rydb.	Slender Wedge Grass		27
Dathonia spicata (L.) Beauv.	Poverty Oat Grass		27
Calamagrostis canadensis (Michx.) Beauv.	Canada Blue-joint		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
Agrostis gigantea Roth	Redtop		27
A. hyemalis (Walt.) B.S.P.	Hair-grass	16	
A. perennans (Walt.) Tuckerm.	Autumn Bent Grass		27
A. scabra Willd.	Rough Hair Grass		27
Cinna arundinacea L.	Stout Wood Grass		27
Phleum pratense L.	Timothy		27
Brachyelytrum erectum (Schreb.) Beauv.	Bearded Shorthusk		27
Milium effusum L.	Wood Millet		27
Oryzopsis asperifolia Michx.	Rough-leaved Mountain Rice		27
Phalaris arundinacea L.	Reed Canary Grass	16	27
Leersia oryzoides (L.) Sw.	Rice Cut Grass	16	27
L. virginica Willd.	White Grass		27
Digitaria ischaemum (Schreb.) Schreb. ex Muhl.	Smooth Crabgrass		27
Panicum capillare L.	Witch Grass		27
P. lanuginosum Ell.	Panic Grass		27
Echinochloa crusgalli (L.) Beauv.	Barnyard Grass		27
Setaria glauca (L.) Beauv.	Yellow Foxtail	16	27
CYPERACEAE	SEDGE FAMILY		
Cyperus strigosus L.	Nut Grass		27
Scirpus atrovirens Willd.	Black Bulrush		27
S. cyperinus (L.) Kunth.	Wool-grass	16	27
S. validus Vahl.	Common Great Bulrush		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
Eleocharis acicularis (L.) R & S	Spike-rush		27
E. erythropoda Steud.	Spike-rush		
E. obtusa (Willd.) Schult.	Blunt Spike-rush		27
Carex alopecoidea Tuckerm. *	Sedge		27
C. bromoides Willd.	Sedge		27
C. brunnescens (Pers.) Poir.	Sedge		27
C. comosa Boott.	Sedge		27
C. crinita Lam.	Sedge		27
C. cristatella Britt.	Sedge		27
C. gracillima Schw.	Sedge		27
C. granularis Muhl. ex Willd.	Sedge		27
C. grayi Carey *	Sedge		27
C. intumescens Rudge	Sedge	16	27
C. lacustris Willd.	Sedge		27
C. leptalea Wahl.	Sedge		27
C. lupulina Muhl. ex Willd.	Sedge	16	27
C. lurida Wahl.	Sedge		27
C. plantaginea Lam.	Sedge	16	27
C. projecta Mack.	Sedge	16	
C. retrorsa Schwein.	Sedge		27
C. scoparia Muhl. ex Willd.	Sedge		27
C. tribuloides Wahl.	Sedge		27
ARACEAE	ARUM FAMILY		
Acorus calamus L.	Sweet Flag		27
Calla palustris L.	Wild Calla		27
Arisaema triphyllum (L.) Torr.	Jack-in-the-pulpit		21,17,27 49

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LEMNACEAE	DUCKWEED FAMILY		
Spirodella polyrhiza (L.) Schleid.	Greater Duckweed		27
Lemna minor L.	Common Duckweed	50,16	27
L. trisulca L.	Star Duckweed		27
JUNCACEAE	RUSH FAMILY		
Juncus acuminatus * (Engelm.) Fernald	Narrow-panicled Rush		27
J. *bufonius* L.	Toad Rush		27
J. effusus L.	Soft Rush		27
J. nodosus L.	Rush		27
J. tennuis Willd.	Path Rush		27
LILIACEAE	LILY FAMILY		
Uvularia sessilifolia L.	Sessile-leaved Bellwort	16	27
Hemerocallis fulva L.	Orange Day-lily		27
Allium canadense L.	Meadow Garlic		27
Lilium canadense var. *michiganense* Farw.	Michigan Lily	16	27
Erythronium americanum Ker.	Yellow Trout Lily	50	27
Smilacena racemosa (L.) Desf.	False Solomon's-seal		27, 17
Maianthemum canadense Desf.	Wild Lily-of-the-valley	16,50	21,49
Polygonatum pubescens (Willd.) Pursh.	Solomon's-seal	16,50	27
Medeola virginiana L.	Indian Cucumber-root	16	27
Smilax herbacea L.	Carrionflower		27
S. tamnoides L. var. *hispida* (Muhl.) Fern.	Bristly Catbrier	16,50	27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
DIOSCOREACEAE	YAM FAMILY		
Dioscorea villosa L. *	Wild Yam		27
IRIDACEAE	IRIS FAMILY		
Iris versicolor L.	Wild Blue Flag	16	27
Sisyrinchium angustifolium Mill.	Pointed Blue-eyed Grass		27
S. montanum Greene *	Little Blue-eyed Grass		27
ORCHIDACEAE	ORCHID FAMILY		
Plantathera lacera (Michx.) G. Don	Ragged Fringed Orchid		27
P. psychodes (L.) Lindl.	Small Purple Fringed Orchid		27
Epipactis helleborine (L.) Crantz.	Helleborine		27
SALICACEAE	WILLOW FAMILY		
Populus balsamifera L.	Balsam Poplar		27
P. deltoides Marsh.	Eastern Cottonwood		17, 27,49
P. grandidentata Michx.	Large-toothed Aspen	16	21, 27,49
P. tremuloides Michx.	Trembling Aspen		21, 27,49
Salix alba L.	White Willow		27
S. amygdaloides Anderss.	Peach-leaved Willow		27
S. babylonica L.	Weeping Willow		21, 27,49
S. bebbiana Sarg.	Beaked Willow		27
S. discolor Muhl.	Pussy Willow		27
S. eriocephala Michx.	Willow		27
S. exigua Nutt.	Sandbar Willow		27
S. fragilis L.	Crack Willow	16	
S. lucida Muhl.	Shining Willow		27
S. nigra Marsh.	Black Willow		21, 27,49
S. purpurea L.	Purple Osier Willow		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
JUGLANDACEAE	WALNUT FAMILY		
Juglans cinerea L.	Butternut	2	17,27,
J. nigra L.	Black Walnut	10,4, 3,2,1, 24	21,17,27, 49
Carya cordiformis (Wang.) K. Koch	Bitternut Hickory		17,27,48
C. ovata (Mill.) K. Koch	Shagbark Hickory	16,2, 1,24, 3,10, 50	21,17,27, 48,49,53
BETULACEAE	BIRCH FAMILY		
Carpinus caroliniana Walt.	Blue Beech	16,50	21,17,27, 48,49,53
Ostrya virginiana (Mill.) K. Koch	Hop Hornbeam	16,24 50	25,21,27, 48,49,53
Betula allegheniensis Britt.	Yellow Birch		27,21,48, 49
B. papyrifera Marsh.	Paper Birch	16	21,17,27, 49
Corylus americana Walt. *	Hazelnut		27
Alnus incana (L.) Muench. ssp. *rugosa* (DuRoi) Clausen	Speckled Alder	16	21,17,27, 49
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech	16,24, 10,50	25,21,27, 48,49,53
Quercus alba L.	White Oak	10,16, 15,1, 24,50	25,21,17, 27,48,49, 53
Q. bicolor Willd.	Swamp White Oak	16,15, 24,10	21,27,48 49,53
Q. macrocarpa Michx.	Bur Oak	15	21,17,27, 49
Q. palustris Muench. *	Pin Oak	16	
Q. rubra L.	Red Oak	16,24, 1,50	25,21,27, 48,49,53

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	7,3,10	27,21,48,49
U. rubra Muhl.	Slippery Elm		21,27,17,49,53
U. thomasii Sarg.	Cork Elm		21,49
CANNABINACEAE	HEMP FAMILY		
Humulus lupulus L.	Common Hop		27
URTICACEAE	NETTLE FAMILY		
Urtica dioica L.	Stinging Nettle		27
Laportea canadensis (L.) Wedd.	Wood Nettle		27
Pilea pumila (L.) Gray	Clearweed		27
Boehmeria cylindrica (L.) Schwein.	False Nettle	16	27
SANTALACEAE	SANDALWOOD FAMILY		
Comandra umbellata (L.) Nutt.	Bastard Toadflax		27
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex acetosella L.	Sheep Sorrel		27
R. crispus L.	Curled Dock		27
R. orbiculatus Gray *	Water Dock		27
R. verticillatus L.	Swamp Dock		27
Polygonum achoreum Blake	Striate Knotweed		27
P. aviculare L.	Knot-grass		27
P. coccineum Muhl.	Swamp Smartweed	16	27
P. hydropiper L.	Marshpepper Smartweed		27
P. lapathifolium L.	Pale Smartweed		27
P. pensylvanicum L.	Pennsylvania Smartweed		27
P. persicaria L.	Lady's Thumb		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
P. punctatum Ell.	Water Smartweed		27
P. saggitatum L.	Arrow-leaved Smartweed	16	27
Tovara virginiana (L.) Raf.	Virginia Knotweed		27
Bilderdykia convolvulus (L.) Dumort.	Wild Buckwheat		27
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium album L.	Lamb's-quarters		27
Atriplex patula L.	Spreading Atriplex		27
AMARANTHACEAE	AMARANTH FAMILY		
Amaranthus retroflexus L.	Redroot Pigweed		27
PHYTOLACCACEAE	POKEWEED FAMILY		
Phytolacca americana L.	Pokeweed		27
PORTULACACEAE	PURSLANE FAMILY		
Claytonia virginica L.	Spring Beauty	50	27
CARYOPHYLLACEAE	PINK FAMILY		
Stellaria graminea L.	Grass-leaved Stitchwort		27
S. longifolia Willd.	Chickweed		27
S. media (L.) Vill.	Chickweed		27
Cerastium vulgatum L.	Mouse-eared Chickweed		27
Dianthus armeria L.	Deptford Pink		27
NYMPHAEACEAE	WATER-LILY FAMILY		
Nymphaea advena Soland.	Large Yellow Pond Lily		27
MAGNOLIACEAE	MAGNOLIA FAMILY		
Liriodendron tulipifera L. *	Tulip-tree		17

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CERATOPHYLLACEAE	HORNWORT FAMILY		
Ceratophyllum demersum L.	Common Coontail		27
RANUNCULACEAE	BUTTERCUP FAMILY		
Hydrastis canadensis L. *	Golden Seal	50	
Coptis groenlandicus (Oeder.) Fern.	Goldthread		27
Actaea pachypoda Ell.	White Baneberry		27
A. rubra (Ait.) Willd.	Red Baneberry		27
Aquilegia canadensis L.	Wild Columbine	16	
Anemone canadensis L.	Canada Anemone		27
A. quinquefolia L.	Wood Anemone		27
Ranunculus abortivus L.	Kidney-leaved Buttercup	16	27
R. acris L.	Tall Buttercup		27
R. pensylvanicus L.f.	Bristly Crowfoot		27
R. scleratus L.	Celery-leaved Buttercup		27
R. septentrionalis Poir.	Bristly Buttercup		27
Thalictrum dioicum L.	Early Meadow Rue		27
T. polygamum Muhl.	Tall Meadow Rue		27
BERBERIDACEAE	BARBERRY FAMILY		
Podophyllum peltatum L.	May-apple	16	21,27,49
Berberis thunbergii DC.	Japanese Barberry	16,50	
LAURACEAE	LAUREL FAMILY		
Lindera benzoin (L.) Blume	Spicebush	16	27,49
BRASSICACEAE	MUSTARD FAMILY		
Lepidium campestre (L.) R.Br.	Field Pepper-grass		27
Thlaspi arvense L.	Stinkweed		27
Sisymbrium officinale (L.) Scop.	Hedge Mustard		27
Brassica kaber (DC.) L. Wheeler	Charlock		27
Barbarea vulgaris R.Br.	Yellow Rocket		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
Rorippa islandica (Oeder) Borbas	Marsh Cress		27
Cardamine douglassii (Torr.) Britt.	Purple Cress		27
C. pensylvanica Muhl.	Spring Cress		27
Capsella bursa-pastoris (L.) Medic.	Shepherd's Purse		27
Erysium cheiranthoides L.	Wormseed Mustard		27
CRASSULACEAE	SEDUM FAMILY		
Sedum triphyllum (Haw.) S.F. Gray	Orpine		27
Penthorum sedoides L.	Ditch-stonecrop		27
GROSSULARIACEAE	GOOSEBERRY FAMILY		
Ribes americanum Mill.	American Black Currant		27
R. cynosbati L.	Pasture Gooseberry	16	27
R. sativum Syme.	European Red Currant		27
HAMAMELIDACEAE	WITCH-HAZEL FAMILY		
Hamamelis virginiana L.	Witch-hazel	16,50	21,27,48, 49
ROSACEAE	ROSE FAMILY		
Spirea alba Du Roi	Narrow-leaved Meadow-sweet	16	17,27,49
Pyrus communis L.	Pear		27
Malus coronaria Rydb.	Wild Crabapple	16	
M. domestica Borkh.	Apple	16	27,49
Amelanchier laevis Wieg.	Smooth Serviceberry	16	27,49
Aronia melanocarpa (Michx.) Ell.	Chokeberry		27
Crataegus macrosperma Ashe.	Hawthorn	16	
C. punctata Jacq.	Hawthorn	16	
Rubus allegheniensis Porter	Common Blackberry	16	
R. hispidus L.	Dewberry		27
R. idaeus L. var. strigosus (Michx.) Maxim.	Wild Red Raspberry	16	27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
R. occidentalis L.	Black Raspberry		27
R. pubescens Raf.	Dwarf Raspberry	16	27
Fragaria virginiana Dene.	Strawberry		27
Potentilla argentea L.	Silvery Cinquefoil		27
P. norvegica L.	Rough Cinquefoil		27
P. recta L.	Sulphur Cinquefoil		27
P. simplex Michx.	Common Cinquefoil	16	27
Geum allepicum Jacq. var. strictum (Ait.) Fern.	Yellow Avens		27
G. canadense Jacq.	Avens		27
G. laciniatum Murr.	Avens		27
Agrimonia gryposepala Wallr.	Agrimony		27
Rosa blanda Ait.	Smooth Rose	16	27
R. carolina L.	Pasture Rose		27
R. eglanteria L.	Sweetbriar		27
R. palustris Marsh.	Swamp Rose	16	27
Prunus americana Marsh.	Wild Plum		27
P. cerasus L.	Sour Cherry		27
P. serotina Ehrh.	Black Cherry	50,16, 10	25,21,17, 48,27,49
P.virginiana L.	Choke Cherry		22,27,48
FABACEAE	PEA FAMILY		
Medicago lupulina L.	Black Medic		27
M. sativa L.	Alfalfa		27
Melilotus alba Desr.	White Sweet-clover		27
M. officinalis (L.) Lam.	Yellow Sweet-clover		27
Trifolium hybridum L.	Alsike Clover		27
T. pratense L.	Red Clover		27
T. repens L.	White Clover		27
Lotus corniculatus L.	Bird's-foot Trefoil		27
Desmodium glutinosum (Muhl.) Wood	Sticky Tick Trefoil	16	
Vicia americana Muhl.	Purple Vetch		27
V. angustifolia L.	Smaller Common Vetch		27
V. cracca L.	Cow Vetch		27
Amphicarpa bracteata (L.) Fern.	Hog-peanut	50	27
Apios americana Medic.	Groundnut		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
GERANIACEAE	GERANIUM FAMILY		
Geranium maculatum L.	Wild Geranium	50,16	27
G. robertianum L.	Herb-robert	16	
OXALIDACEAE	WOOD-SORREL FAMILY		
Oxalis stricta L.	European Wood Sorrel		27
RUTACEAE	RUE FAMILY		
Zanthoxylum americanum Mill.	Prickly-ash		27
EUPHORBIACEAE	SPURGE FAMILY		
Acalypha paucifolia Willd.	Three-seeded Mercury		27
Euphorbia vermiculata Raf.	Hairy-stemmed Spurge		27
ANACARDIACEAE	CASHEW FAMILY		
Rhus radicans L.	Poison Ivy	50,16	27,48
R. typhina L.	Staghorn Sumac		27,49
R. vernix L.	Poison Sumac		27
AQUIFOLIACEAE	HOLLY FAMILY		
Ilex verticillata (L.) Gray	Winterberry	16	27
ACERACEAE	MAPLE FAMILY		
Acer nigrum Michx. f.	Black Maple		21,49
A. rubrum L.	Red Maple	16	21,17,27,48,49
A. saccharinum L.	Silver Maple	16,24	25,21,48,49,53
A. saccharum Marsh.	Sugar Maple	16,24,10,50	25,21,27,48,49,53

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BALSAMINACEAE	JEWEL-WEED FAMILY		
Impatiens biflora Walt.	Spotted Jewelweed	16	21,27,49
VITACEAE	GRAPE FAMILY		
Vitis riparia Michx.	Wild Grape		27
Parthenocissus quinquefolia L.	Virginia Creeper		27
P. vitacea (Knerr.) Hitchc.	Virginia Creeper	16,50	27
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	16,50	25,17,48, 49,53
HYPERICACEAE	ST.JOHN'S-WORT FAMILY		
Hypericum mutilum L.	Slender St. John's-wort		27
H. perforatum L.	Common St. John's-wort		27
H. punctatum Lam.	Spotted St. John's-wort		27
H. virgatum Lam.	Copper-colored St. John's-wort		27
VIOLACEAE	VIOLET FAMILY		
Viola conspersa Reich.	Dog Violet		27
V. cucullata Ait.	Stemless Blue Violet		27
V. eriocarpa Schw.	Smooth Yellow Violet		27
V. pallens (Banks.) Brain	White Violet		27
V. papilionacea Pursh.	Stemless Blue Violet		27
V. pubescens Ait.	Downy Yellow Violet		27
V. sororia Willd.	Stemless Blue Violet		27
LYTHRACEAE	LOOSESTRIFE FAMILY		
Lythrum salicaria L.	Purple Loosestrife		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
NYSSACEAE	SOUR GUM FAMILY		
Nyssa sylvatica Marsh. *	Tupelo	16,15, 10	21,27,49
ONAGRACEAE	EVENING-PRIMROSE FAMILY		
Ludwigia palustris var. *americana* (DC.) Fern. & Griseb.	Water Purslane		27
Epilobium coloratum Bieh.	Hairy Willowherb		27
E. hirsutum L.	Hairy Willowherb		27
Oenothera biennis L.	Hairy Yellow Evening-primrose		27
O. perrenis L.	Sundrops		27
Circaea quadrisulcata (Maxim.) Franch. & Sav.	Enchanter's Nightshade		27
HALORAGACEAE	WATER-MILFOIL FAMILY		
Myriophyllum verticillatum L. *	Green Water-milfoil		27
ARALIACEAE	GINSENG FAMILY		
Aralia nudicaulis L.	Wild Sarsparilla		27
A. racemosa L.	Spikenard		27
Panax quinquefolium L. *	Ginseng		51
ADIACEAE	CARROT FAMILY		
Sanicula canadensis L. *	Short-styled Snakeroot		27
S. marlandica L.	Black Snakeroot	16	27
Osmorhiza claytoni (Michx.) Clarke	Sweet Cicely	16	27
Cicuta bulbifera L.	Bulbous Water-hemlock		27
C. maculata L.	Spotted Water-hemlock	16	27
Carum carvi L.	Caraway		27
Sium suave Walt.	Water-parsnip		27
Pastinaca sativa L.	Wild Parsnip		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
Daucus carota L.	Wild Carrot	16	27
CORNACEAE	DOGWOOD FAMILY		
Cornus florida L.	Flowering Dogwood		21,27,49
C. obliqua Raf.	Silky Dogwood	16	
C. racemosa Lam.	Gray Dogwood		
PYROLACEAE	WINTERGREEN FAMILY		
Monotropa hypopithys L.	Pinesap		27
M. uniflora (L.) Gray	Indian-pipe	15	27
ERICACEAE	HEATH FAMILY		
Gaultheria procumbens L.	Wintergreen	50,16	27
Gaylussacia baccata (Wang.) K. Koch	Black Huckleberry	16	27
Vaccinium angustifolium Ait.	Low Sweet Blueberry	16	
V. corymbosum L.	Highbush Blueberry	16	27
V. pallidum Ait.	Low Sweet Blueberry		27
PRIMULACEAE	PRIMROSE FAMILY		
Lysimachia ciliata L.	Fringed Loosestrife		27
L. nummularia L.	Moneywort		27
L. terrestris L.	Swamp Loosestrife		27
L. thyrsiflora L.	Tufted Loosestrife		27
Trientalis borealis Raf.	Star-flower	16	17,27
Anagallis arvensis L.	Scarlet Pimpernel		27
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash	24,16 10	25,21,48, 49,53
F. nigra Marsh.	Black Ash	16	25,21,49, 53
F. pennsylvanica Marsh.	Red Ash	50	27,21,49

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
GENTIANACEAE	GENTIAN FAMILY		
Gentiana andrewsii Griseb.	Closed Blue Gentian		27
APOCYNACEAE	DOGBANE FAMILY		
Apocynum androsaemifolium L.	Spreading Dogbane		27
A. cannabinum L.	Hemp Dogbane		27
ASCLEPIADACEAE	MILKWEED FAMILY		
Asclepias incarnata L.	Swamp Milkweed	16	
A. syriaca L.	Common Milkweed		27
CONVOLVULACEAE	MORNING-GLORY FAMILY		
Cuscuta gronovii Willd.	Dodder		27
Convolvulus arvensis L.	Field Bindweed		27
C. sepium L.	Hedge Bindweed		27
HYDROPHYLLACEAE	WATERLEAF FAMILY		
Hydrophyllum virginianum L.	Virginia Waterleaf		27
BORAGINACEAE	BORAGE FAMILY		
Hackelia virginiana (L.) Johnston	Stickseed		27
Myosotis laxa Lehm.	Forget-me-not		27
Lithospermum arvense L.	Corn Gromwell		27
L. officinale L.	Common Gromwell		27
VERBENIACEAE	VERVAIN FAMILY		
Verbena hastata L.	Blue Vervain		27
V. urticifolia L.	White Vervain		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LAMIACEAE	MINT FAMILY		
Teucrium canadense L.	Germander		27
Scutellaria galericulata L.	Common Skullcap		27
S. lateriflora L.	Mad-dog Skullcap		27
Nepeta cataria L.	Catnip		27
Glechoma hederacea L.	Ground Ivy		27
Prunella vulgaris L.	Heal-all	16	27
Leonurus cardiaca L.	Motherwort		27
Stachys hispida Pursh.*	Hedge Nettle		27
Hedeoma pulegioides (L.) Pers.	Pudding-grass		27
Satureja vulgaris (L.) Fritsch.	Wild Basil		27
Lycopus americanus Muhl.	American Water-horehound		27
L. uniflorus Michx.	Water-horehound		27
Mentha arvensis L.	Field Mint		27
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum nigrum L.	Black Nightshade		27,17
S. dulcamara L.	Climbing Nightshade	50,16	
SCROPHULARIACEAE	FIGWORT FAMILY		
Verbascum thapsus L.	Common Mullein		27
Linaria vulgaris Mill.	Yellow Toadflax		27
Chelone glabra L.	Turtlehead		27
Penstemon hirsutus (L.) Willd.	Beard-tongue	50	27
Mimulus ringens L.	Square-stemmed Monkey Flower		27
Gratiola neglecta Torr.	Hedge-hyssop		27
Veronica arvensis L.	Corn Speedwell		27
V. officinalis L.	Common Speedwell		27
V. scutellata L.	Marsh Speedwell		27
V. serpyllifolia L.	Thyme-leaved Speedwell		27
Pedicularis canadensis L.	Lousewort		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
OROBANCHACEAE	BROOM-RAPE FAMILY		
Epifagus virginiana (L.) Bart.	Beech-drops	50,16	27
LENTIBULARIACEAE	BLADDERWORT FAMILY		
Utricularia vulgaris L.	Common Bladderwort		27
PLANTAGINACEAE	PLANTAIN FAMILY		
Plantago lanceolata L.	Narrow-leaved Plantain		27
P. major L.	Broad-leaved Plaintain	16	27
P. rugelii Dcne.	Rugel's Plantain		27
RUBIACEAE	MADDER FAMILY		
Cephalanthus occidentalis L.	Buttonbush	16,15	26,27
Mitchella repens L.	Partridge-berry	16	27
Galium aparine L.	Cleavers		27
G. circaezans Michx.	Wild Licorice	16	
G. mollugo L.	Wild Madder		27
G. obtusum Bigel.	Bedstraw		27
G. tinctorium L.	Stiff Marsh Bedstraw		27
G. trifidum L.	Bedstraw		27
G. triflorum Michx.	Sweet-scented Bedstraw		27
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Sambucus canadensis L.	Common Elder	16	21,27,49
Viburnum acerifolium L.	Maple-leaved Viburnum	16	21,27,48,49
V. cassinoides L.	Wild-raisin	16	
V. lentago L.	Nannyberry	16	21,27,49
V. rafinesquianum Schult.	Downy Arrow-wood	16	
V. recognitum Fern. *	Southern Arrow-wood	16	27
Lonicera canadensis Bartr.	Fly Honeysuckle		27
L. dioica L.	Glaucous Honeysuckle	16	27
L. tatarica L.	Tartarian Honeysuckle	16	27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
DIPSACACEAE	TEASEL FAMLY		
Dipsacus fullonum L.	Teasel		27
CUCURBITACEAE	GOURD FAMILY		
Echinocystis lobata (Michx.) T. & G.	Wild Cucumber		27
CAMPANULACEAE	HAREBELL FAMILY		
Lobelia inflata L.	Indian Tobacco	16	27
ASTERACEAE	ASTER FAMILY		
Eupatorium maculatum L.	Spotted Joe-pye Weed		27
E. perfoliatum L.	Boneset		
Solidago altissima L.	Tall Goldenrod		27
S. bicolor L.	White Goldenrod	16	27
S. canadensis L.	Canada Goldenrod	16	27
S. gigantea Ait.	Late Goldenrod		27
S. hispida Muhl.	Hairy Goldenrod	16	
S. juncea Ait.	Early Goldenrod		27
S. nemoralis Ait.	Gray Goldenrod		27
S. rugosa Ait.	Rough Goldenrod		27
Aster cordifolius L.	Heart-leaved Aster	16	27
A. laevis L.	Smooth Aster		27
A. lateriflorus (L.) Britt.	One-sided Aster		27
A. macrophyllus L.	Large-leaved Aster	16	27
A. novae-angliae L.	New England Aster		27
A. pilosus Willd. *	Spray Aster		27
A. puniceus L.	Red-stemmed Aster		27
A. simplex Willd.	Panicled Aster		27
A. umbellatus Mill.	Flat-topped White Aster		27
Erigeron annuus (L.) Pers.	Annual Fleabane		27
E. philadelphicus L.	Philadelphia Fleabane		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
E. ramosus (Walt.) B.S.P.	Daisy Fleabane		27
Antennaria neglecta Greene	Pussytoes		27
Gnaphalium uliginosum L.	Low Cudweed		27
Ambrosia artemisiifolia L.	Common Ragweed		17,27
A. trifida L.	Giant Ragweed	16	27
Helianthus decapetalus L.	Wood Sunflower		27
Bidens cernua L.	Nodding Beggar-ticks	16	
B. connata Muhl.	Devil's Beggar-ticks	16	
B. discoidea (T.& G) Britton	Small Beggar-ticks		27
B. vulgata Greene	Tall Beggar-ticks		27
Anthemis cotula L.	Stinking Mayweed		27
Achillea millefolium L.	Yarrow	16	27
Matricaria suaveolens L.	Pineapple Weed		27
Leucanthemum vulgare Lam.	Ox-eye Daisy		27
Artemisia biennis Willd.	Biennial Wormwood		27
Erechtites hieraciifolia (L.) Raf.	Fireweed		27
Arctium lappa L.	Great Burdock		27
A. minus (Hill.) Bernh.	Common Burdock		27
Cirsium arvense (L.) Scop.	Canada Thistle		27
C. vulgare (Savi.) Tenore	Bull Thistle		27
Centaurea jacea L.	Brown Knapweed		27
Cichorium intybus L.	Chickory	16	27
Leontodon taraxacoides (Vill.) Merat	Fall Hawkbit		27
Sonchus arvensis L.	Perrenial Sow-thistle		27
S. asper (L.) Hill	Spiny Annual Sow-thistle		27
Lactuca biennis (Moench) Fern.	Tall Blue Lettuce		27
L. canadensis L.	Canada Lettuce		27
L. virosa L.	Prickly Lettuce		27
Prenanthes altissima L.	White Lettuce		27
Hieracium aurantiacum L.	Orange Hawkweed	50	27
H. caespitosum Dumort.	Yellow Hawkweed		27

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BRYOPHYTES			
SPHAGNACEAE			
Sphagnum centrale C. Jens. ex. H. Arnell & C. Jens.		16	
S. squarrosum Crome		16	
DICRANACEAE			
Dicranum montanum Hedw.		16	
LEUCOBRYACEAE			
Leucobryum glaucum (Hedw.) Angstr. ex. Fries.		16	
AMBLYSTEGIACEAE			
Amblystegium varium (Hedw.) Lindb.		16	
POLYTRICHACEAE			
Polytrichum commune Hedw.		16	

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE LF-3C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Great Blue Heron	*Ardea herodias*	2,3, 4,5, 50,35, 10,11, 16,34	17,30,31, 32,43,39, 41,21,49, 53
Little Blue Heron	*Egretta caerulea*	6,10	52
Green-backed Heron	*Butorides striatus*	3,5, 10,50	17
Tundra Swan	*Cygnus columbianus*	6,10	
Canada Goose	*Branta canadensis*	1,4,6, 10,38	31,43
Wood Duck	*Aix sponsa*	6,10	8
American Black Duck	*Anas rubripes*		8
Mallard	*Anas platyrhynchos*	6,10	8,17
Blue-winged Teal	*Anas discors*		8
Canvasback	*Aythya valisineria*	3	
Bufflehead	*Bucephala albeola*	3,6, 10	
Turkey Vulture	*Cathartes aura*	6,10, 16	31,37
Red-tailed Hawk	*Buteo jamaicensis*	3,5, 50, 10,15, 47	17,21,22, 39,49
American Kestrel	*Falco sparverius*	3,5, 47,10, 15,50	
Ring-necked Pheasant	*Phasianus colchicus*	2,6, 10	
Ruffed Grouse	*Bonasa umbellus*	2	17,21,48, 49,53
American Coot	*Fulica americana*	6,10	
Killdeer	*Charadrius vociferus*	5,10, 16,50	17,22,21, 49
Spotted Sandpiper	*Actitis macularia*	5,10, 50	
American Woodcock	*Scolopax minor*	3,4,5, 10,50	17,21,49

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Rock Dove	*Columba livia*	3,5, 50, 10,16	22
Mourning Dove	*Zenaida macroura*	5,10, 50,16, 47	
Eastern Screech-Owl	*Otus asio*	15	
Great Horned Owl	*Bubo virginianus*	3,5, 10,50	
Snowy Owl	*Nyctea scandiaca*	3	
Common Nighthawk	*Chordeiles minor*	6,10	
Whip-poor-will	*Caprimulgus vociferus* *		5,10
Ruby-throated Hummingbird	*Archilochus colubris*		22
Belted Kingfisher	*Ceryle alcyon*		
Downy Woodpecker	*Picoides pubescens*	3,5, 10,16, 50	17
Northern Flicker	*Colaptes auratus*	3,5,50, 10,16	
Pileated Woodpecker	*Dryocopus pileatus*	15	
Eastern Wood-Pewee	*Contopus virens*	3,5,50, 10,16	17,22
Least Flycatcher	*Empidonax minimus*		22
Great Crested Flycatcher	*Myiarchus crinitus*	3,5,50, 10,15	17,22
Eastern Kingbird	*Tyrannus tyrannus*		17,22
Horned Lark	*Eremophila alpestris*	3,5, 10,50	22
Purple Martin	*Progne subis*		17,22
Tree Swallow	*Tachycineta bicolor*	5,10, 50	
Bank Swallow	*Riparia riparia*		22
Barn Swallow	*Hirundo rustica*	5,10, 50	
Blue Jay	*Cyanocitta cristata*	5,10, 15,16, 50,47, 33	17,21

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
American Crow	Corvus brachyrhynchos	5,10, 50,47	17
Black-capped Chickadee	Parus atricapillus	5,10, 16,33, 50	17,21
White-breasted Nuthatch	Sitta carolinensis	16	17
House Wren	Troglodytes aedon		17
Eastern Bluebird	Sialia sialis *	6,10 43	
Veery	Catharus fuscescens		17
Wood Thrush	Hylocichla mustelina		5,10,17 22
American Robin	Turdus migratorius	5,10, 15,16 50	17,22
Gray Catbird	Dumetella carolinensis	5,10, 16,50	17,22
Brown Thrasher	Toxostoma rufum	6,10	
Cedar Waxwing	Bombycilla cedrorum	3,5,6, 10,16, 50	
European Starling	Sturnus vulgaris	16	17,22
Yellow-throated Vireo	Vireo flavifrons	3,5, 10,50	
Warbling Vireo	Vireo gilvus		22
Red-eyed Vireo	Vireo olivaceus	3,5, 10,50	
Yellow Warbler	Dendroica petechia	3,5, 10,50	22
Chestnut-sided Warbler	Dendroica pensylvanica	16	
Cerulean Warbler	Dendroica cerulea		23
Common Yellowthroat	Geothlypis trichas	3,5, 10,15, 16,50	22
Scarlet Tanager	Piranga olivacea	3,5, 10,50	
Northern Cardinal	Cardinalis cardinalis	3,5, 10,50, 33	

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	6,10	5,10,17, 49
American Tree Sparrow	*Spizella arborea*	47	
Chipping Sparrow	*Spizella passerina*		22
Savannah Sparrow	*Passerculus sandwichensis*	5,10, 50	22
Song Sparrow	*Melospiza melodia*	5,10	22
Swamp Sparrow	*Melospiza georgiana*	16,50	
Bobolink	*Dolichonyx oryzivorus*	3,5, 10,50	21,22,49
Red-winged Blackbird	*Agelaius phoeniceus*	5,10, 50	21,22,49
Eastern Meadowlark	*Sturnella magna*	3,5, 10,50	22
Common Grackle	*Quiscalus quiscula*	3,5, 10,50	22
Brown-headed Cowbird	*Molothrus ater*	5,10, 50,47	22
Northern Oriole	*Icterus galbula*	3,5, 10,50	22
American Goldfinch	*Carduelis tristis*	5,10, 16,50	22
House Sparrow	*Passer domesticus*	5,10, 47,50	22

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE LF-3C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Opossum	*Didelphis virginiana* *	3,4,7,10	18,44,39
Star-nosed Mole	*Condylura cristata*		17
Eastern Cottontail	*Sylvilagus floridanus*	2,7,10,15,38	17
European Hare	*Lepus europaeus*	7,10	17
Eastern Chipmunk	*Tamias striatus*		17
Woodchuck	*Marmota monax*	16	17,21,49
Grey Squirrel	*Sciurus carolinensis*		17,49
American Red Squirrel	*Tamiasciurus hudsonicus*	16	17
Muskrat	*Ondatra zibethicus*	7,8,10,12,13,14,46	17,19,20,41,42,43
Meadow Vole	*Microtus pennsylvanicus*		17
Coyote	*Canis latrans*	3,7,8,10	31
Wolf	*Canis lupus*	1,7,8,10	
Red Fox	*Vulpes vulpes*	1,2,7,10	17
Raccoon	*Procyon lotor*	7,8,10,12,13,16	17,21,49
Ermine	*Mustela erminea*	7,10	
American Mink	*Mustela vison*	7,10	
Striped Skunk	*Mephitis mephitis*	7,10	
White-tailed Deer	*Odocoileus virginianus*	1,2,3,4,7,9,10,15,16,38	36,39,40,41,42,48,49,21,53

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE LF-3C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
American Toad	*Bufo a. americanus*		17,49
Bullfrog	*Rana catesbeiana*		21
Green Frog	*Rana clamitans*	45	
Northern Leopard Frog	*Rana pipiens*	16	17
Wood Frog	*Rana sylvatica*	15	
Midland Painted Turtle	*Chrysemys picta marginata*	16,45	17
Eastern Smooth Green Snake	*Opheodrys v. vernalis*		44
Northern Brown Snake	*Storeria d. dekayi*		17
Eastern Ribbon Snake	*Thamnophis s. sauritus*		48
Eastern Garter Snake	*Thamnophis s. sirtalis*	16	17,49,44

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE LF-3C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Central Mudminnow	*Umbra limi*		29
Northern Pike	*Esox lucius*	4,28	17,37,43
Carp	*Cyprinus carpio*		17
Golden Shiner	*Notemigonus crysoleucas*		29
Emerald Shiner	*Notropis atherinoides*		29,8
Bluntnose Minnow	*Pimephales notatus*		8
Fathead Minnow	*Pimephales promelas*		29
Creek Chub	*Semotilus atromaculatus*		8
White Sucker	*Catostomus commersoni*		17
Black Bullhead	*Ictalurus melas*		29
Yellow Bullhead	*Ictalurus natalis*		29
Brown Bullhead	*Ictalurus nebulosus*		17
Channel Catfish	*Ictalurus punctatus*		17
Rock Bass	*Ambloplites rupestris*		17
Pumpkinseed	*Lepomis gibbosus*		29,17
Bluegill	*Lepomis macrochirus*		17
Largemouth Bass	*Micropterus salmoides*		17
White Crappie	*Pomoxis annularis*		29,17
Black Crappie	*Pomoxis nigromaculatus*		17
Yellow Perch	*Perca flavescens*		17

DATA SOURCES FOR TABLES 5-9

1. Peaire, 1984.
2. Davis, P., 1984.
3. Vaughan, 1984.
4. Cosby, 1984.
5. Black, 1984.
6. Vaughan and Vaughan, 1984.
7. Vaughan, Vaughan and Black, 1984.
8. Ontario Ministry of Natural Resources, 1984d.
9. Ontario Ministry of Natural Resources, 1984b.
10. The Elcho Site Study Committee, 1984.
11. Baarda, 1984.
12. Merritt, 1984.
13. McPherson, 1984.
14. Boverhof, 1984b.
15. Gartner Lee Associates Limited, 1984a.
16. Gartner Lee Associates Limited, 1984b.
17. Niagara Peninsula Conservation Authority, 1982.
18. Zantingh, 1984.
19. Davis, C., 1984.
20. Souter, 1984.

DATA SOURCES FOR TABLES 5-9 (cont'd)

21. Brady et al., 1980a.
22. Ontario Breeding Bird Atlas, 1984.
23. Curry, 1984.
24. Ontario Ministry of Natural Resources, 1979a.
25. Ontario Ministry of Natural Resources, 1979b.
26. Ontario Ministry of Natural Resources, 1984c.
27. Putnam, 1975.
28. Krick, 1984.
29. Ontario Ministry of Natural Resources, 1976a.
30. Wagter, 1984.
31. Huizinga, 1984.
32. Zumstein, 1984.
33. Elcho United Church Elders and Members, 1984.
34. Vanderweir, 1984.
35. Wisniewski, 1984.
36. Gilmer, 1984.
37. Gerryts, G., 1984.
38. Swayze, 1984.
39. Krahne, 1984a.
40. VanSoelen, 1984.

DATA SOURCES FOR TABLES 5-9 (cont'd)

41. Gerryts, W., 1984.
42. Aantjes, 1984.
43. Ullman, 1984.
44. Krahne, 1984b.
45. Gartner Lee Associates Limited, 1984c.
46. Gartner Lee Associates Limited, 1984d.
47. Gartner Lee Associates Limited, 1984e.
48. Brady *et al.*, 1979.
49. Brady *et al.*, 1980b.
50. Regional Municipality of Niagara Ecological and Environmental Advisory Committee, 1984.
51. Chippawa Watershed Association, Inc., 1985.
52. Vaughan, 1985.
53. Brady, 1985.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site LF-3C from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 10. Interview numbers are related to identifications assigned by Ecologistics Ltd. during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview form are contained in Table 11. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

During conversations with landowners regarding permission to conduct field work on their properties, we followed up on questions which arose from a review of "Walk-and-Talk" interview data. Table 12 is an example of a completed "Public Contact - Local Data Collection" form which records such a follow up conversation.

Completed "Public Contact - Local Data Collection" forms are on file at Gartner Lee Associates Limited. Table 13 is a summary of information arising from these follow up contacts.

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-3C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Louis Douma	8-120	LF-3C (S)	62-1A	None
Elcho United Church Elders and Members	8-131 8-132	LF-3C (S)	127-1	3 common bird species walnut trees
Mr. David Vanderweir	8-36	LF-3C (S)	82-1a	blue herons and hawks vegetable garden
Mr. Ted Wisniewski	8-35	LF-3C (S)	65-2	blue heron and rabbits
Mr. Ralph & Harry Janssen	8-6 8-148 8-59 8-152 8-130	LF-3C (S,SV)	219-2	None
Mr. Zumstein	8-151-1	LF-3C (SV)	104-7	blue herons
Mr. Archie Huizinga	8-78 8-79 8-99	LF-3C (SV)	83-2	4 common birds and mammals
Mr. & Mrs. G. Gilmer	8-148	LF-3C (SV)	81-2	deer

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-3C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Ben Wagter	8-98 8-116	LF-3C (SV)	107-2	- blue herons and wolves - aware of muskrat trappers - hunts raccoons in fall
W. VanSoelen	8-101	LF-3C (SV)	92-2	deer
Vanderweir	8-36	LF-3C	818	None
Mr. Robert Douma	8-119 13-139	LF-3C (S,SV)	63-2	- firewood from bush - sold logs out of bush: roll assessment number 8-119
Mr. J. Swayze	8-127	LF-3C (S)	61-2	- deer, ducks, geese - hunts rabbits - picks mushrooms and strawberries
W. Gerryts	8-48	LF-3C (SV)	102-2	- six common animals - pick strawberries and elderberries
Mr. John Aantjes	8-125 8-136	LF-3C (SV)	91-2	- five common animals - pick wild strawberries

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-3C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Dr. Doris Ullman	8-3	LF-3C (S)	16-1	- common bird and tree species and bluebird, blue herons - heron nesting location given - resource use includes: wild strawberry, herb consumption - vegetable garden - pike in stream in spring
Mr. Philip Davis	8-129	LF-3C (S)	69-1	- list of several species of flora and fauna including: Walnut, Hickory Trees and pike - property is used for hunting - firewood harvested from bush - fruit from trees eaten - wild strawberries eaten
Mr. Edward Peaire	8-3	LF-3C (S)	7-2	- list of several common species of flora and fauna - large specimens of White Oak - hunters use property - some maple syrup taken

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-3C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Norman Vaughan	8-2 8-3 8-4 8-76 8-96	LF-3C (SV)	90-2	- extensive list of bird species (26) including Yellow-throated Vireo - other faunal species listed including "possum", grass pike - woods provide fuelwood, maple syrup and logs for woodworking
Mr. Elgin Cosby	8-4	LF-3C (S)	115-2	- 7 bird species listed including "white albino crane" - other wildlife includes: "deer run", opossum and pike - fished creek for pike - take firewood from bush
Kricks	8-11 8-12 8-24 8-129 8-151 8-163 8-164 8-165 8-167 8-175 8-179	LF-3C (S,SV)	280-2 281-2	- registered trap line on property - four common wildlife species reported - some maple syrup taken - fuelwood from bush - consumption of strawberries and mushrooms

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-3C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. J. Krahne	8-7	LF-3C (SV)	242-1	- 8 wildlife species listed including opossum and "snakes 3 different kinds"
Mr. & Mrs. Geo. Baarda	8-36	LF-3C (S)	854	- blue herons return every year
Mr. George Gerryts	8-48 8-75 8-95	LF-3C (SV)	224-2	- 9 common bird species listed including; Turkey Vulture and Canada Geese (Flyway) - 5 other wildlife species listed including Grass Pike - hunting and trapping on property - MNR logged bush - wild raspberry consumption
Mr. Harry Van Marrum	8-35-1 8-189	LF-3C (S,SV)	694	- 3 wildlife species including "partridge" - consumption of pears and hickory nuts

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-3C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Albertus Zantingh	8-49	LF-3C (SV)	105-2	- opossum

Interview Identification Number: ______

TABLE 11: BIOLOGY QUESTIONS LISTED ON WALK-AND-TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

TABLE 12: EXAMPLE OF A COMPLETED "PUBLIC CONTACT - LOCAL DATA COLLECTION" FORM

PUBLIC CONTACT - LOCAL DATA COLLECTION

No. 11

CANDIDATE SITE LF-3C

PROPERTY ROLL NUMBER(S) 8-95, 8-48 (Adj) 8-75 (Vic.)

LANDOWNER:

NAME Mr + Mrs G. Gerrytys

ADDRESS RR #3 Wellandport.

TELEPHONE NUMBER 386-6448

LANDOWNER CONTACTED BY:

TELEPHONE ✓

MAIL

VISIT

DATE OF CONTACT:

20/09/84 CPH

ISSUE(S) TO DISCUSS:

- Turkey Vultures - observed in back field, landowner ran over rabbit with farm implement and 5 or 6 very large birds came down to feed on remains. This was in back field - no evidence of nests. 1984 June.
- Grass Pike (may be carp, 18 yr old son identified as Grass Pike) in Welland River, jumping, from early spring to August up to 18" long, elderly gentleman in red truck has been. seen fishing for them (CPH has also seen older fellow in red truck fishing with spear in Grassy Brook. see Bio field notes for PI-27E) LF-3 Mrs. Gerryts says she does not know what this fellow does with fish, as she herself would not eat them. She will try to find out name of this fellow.

over

REMARKS:

Woodlot at north end of RA# 8-95 (Lot 8 Con 1) has been marked by MNR (contact: Paul Van Chandel) and will be cut "any time now" by Maynard Snyder of Dunville

SKETCH MAP:

TABLE 13: SUMMARY OF FOLLOW-UP INTERVIEW DATA (LF-3C)

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	BIOLOGY COMMENTS
Mr. Harry Van Marrum	8-35-1 8-36	LF-3C (S,SV)	- discussed the hickory reported from site - Mr. VanMarrum does not know the species of tree

Mr. & Mrs. G. Gerryts	8-48
	8-75
	8-95
		LF-3C
		(SV)
			- Turkey Vultures were discussed:
			  - no evidence of nests
			  - observed 5 or 6 in field feeding in June 1984
			- Grass Pike
			  - may be carp, unsure of identification
			  - have seen person fishing for pike - consumption unknown
			- Woodlot
			  - MNR has marked woods on assessment roll number 8-95: the area is target for cutting

Mr. Loyal Krick	8-129 (S)	LF-3C	- only 8-129 discussed - he has planted 21 walnut trees (approx. 40 years old) - Hickory trees (species unknown) are found on "Hickory Island" (location described) - pike occasionally taken from Beaver Creek - cattle graze in Maple bush near Creek

TABLE 13: SUMMARY OF FOLLOW-UP INTERVIEW DATA (LF-3C)'

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	BIOLOGY COMMENTS
Mrs. Krahne	8-7	LF-3C (SV)	Snakes - she could not identify the three different snakes: her verbal descriptions suggest that two of the species were; Eastern Garter Snake and Eastern Smooth Green Snake Opossum - she indicated the species seems to be becoming more common - she has seen them more frequently in the spring
Mr. Robert Douma	8-119	LF-3C (S)	- discussion pertains to 8-119 - logging in woods on property for veneer logs and fuelwood (probably sawlogs too) - he indicated trees were marked by MNR

9.0 BIOLOGY
SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale. Completed data forms and station location maps are in working files at GLAL.

Table 14 is an example of a completed field data form. It is for station 9 on Site LF-3C.

TABLE 14: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - LF-3C

FIELD INVESTIGATIONS

STATION 9 ROLL 1 PHOTO(S) 6

VEGETATION

VEGETATION ASSOCIATION Di fringe on M FRI DOMINANTS $\underline{H}$ Ow$_3$ Ms$_2$ Or$_2$ I$_1$ Be$_1$ Aw$_1$

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species>6m	40	5	Nyssa sylvatica, (Pin Oak) Acer rubra Ulmus americana Q. Bicolor
Tree Species <6m	20	5	Ulmus americana
Shrub Species >1.5 m	10	2	(c)
Shrub Species <1.5 m	5	2	Viburnum acerifolium
Graminoid/Herb Species	5	2	Onoclea sensibilis Solidago (c)
Moss/Lichen Species	/	2	

# Snags/Hectare

Average Canopy Height: FRI 16m, Field 16m Surface Wetness 2 Vegetation Mapping Change

Comments / Rare Or Uncommon Species:

Pin Oak Specimen ~ 35 cm dbh Tupelo dbh ~ 25cm

- Single Acer glauca

WILDLIFE

Gray Catbird - 1 (C)
Blue Jay - 1 (C)
Black-capped chickadee - 1 (c)

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type dp Average Width 5m Average Depth 20cm Permanence p Turbidity c

Approximate Area ? see length on photo

Shoreline Conditions V organic Bottom Conditions organ.

Fish And Invertebrate Species Observed:

Submergent, Emergent Plant Species: Lemna minor is (few); some Bidens connata + other [illegible]

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

note: deciduous lowland [illegible]

Pin, S.W. Oaks · Black Gum scattered [illegible]

ph 5.0 Botanical verification

LF 3C - 08 Solidago hispida Muhl.

LF - 3C - 09 Viburnum recognitum Fern.

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10.0 OWMC PHASE 4A - BIOLOGY FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2

SEPTEMBER, 1984

Gartner
Lee
Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ■ Markham, Ontario ■ L3P 3J9 ■ 416-477-8400
Telex-06-986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m². The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m² gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m². Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.0 APPENDICES

3.1 SITE ACCESS PERMISSION FORM

No.________

CANDIDATE SITE ____________________

PROPERTY ROLL NUMBER(S) ____________________

____

LANDOWNER:

NAME ____________________

ADDRESS ____________________

TELEPHONE NUMBER ____________________

LANDOWNER CONTACTED BY:

TELEPHONE __________ DATE OF CONTACT:

MAIL __________ ____________________

VISIT __________

PERMISSION TO ENTER PROPERTY:

GRANTED __________

NOT GRANTED __________ REASON ____________________

PERMISSION TO COLLECT PLANT SAMPLES:

GRANTED __________

NOT GRANTED __________ REASON ____________________

COMMENTS: ____________________

____

____

____

____

____

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3.2

FIELD OBSERVATION SHEET | **BIOLOGICAL STATIONS :** | **SITE**

OWMC 84-S18.2

Gartner Lee Associates Limited

SITE

Candidate Site: ________________

A) Background

Air Photos: ________________
Photographs Taken:
Roll: ________ **Photos:** ________________
Corresponding Maps:
____
____

Observer(s): ________________
Date Of Visit: ________________
Time & Duration ________________
Weather:
Present: ________________
Previous Day: ________________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ________________
____
____

Flora: ________________
____
____

Fauna: ________________
____
____

Comments: ________________
____
____
____
____
____

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

- **Vegetation Association**

Forest:	deciduous	D
	coniferous	C
	mixed	M
Thicket:	shrub	T
Field:	crop land	C
	recently abandoned	FR
	old	FO
	successional	FS
Others:	marsh	M
	industrial/residential/ manicured	R

Upland = u
Lowland = l

Descriptors:

flooded	(F)
cutover and/or recent secondary succession	(C)
post-fire succession	(P)
grazed	(G)
drained	(D)
plantation	(Pl)

- **Surface Wetness**

dry	0
moist	1
wet	2

Wildlife

- **Observation Code**

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

- **Type**

stream	s
pond	p
diffuse ponding and swales	dp

- **Permanence**

possibly permanent	p
probably intermittent	pi
intermittent	i

- **Turbidity**

clear	c
cloudy	cl
turbid	t

- **Shoreline Conditions**

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

- **Bottom Conditions**

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

Page ___ of ___

SITE ______

FIELD INVESTIGATIONS

STATION ______ ROLL ______ PHOTO(S) ______

VEGETATION

VEGETATION ASSOCIATION ______ FRI DOMINANTS ______

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species >6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species <1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ______

Average Canopy Height: FRI ______, Field ______ Surface Wetness ______ Vegetation Mapping Change ______

Comments/Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ______ Average Width ______ Average Depth ______ Permanence ______ Turbidity ______

Approximate Area ______

Shoreline Conditions ______ Bottom Conditions ______

Fish And Invertebrate Species Observed: ______

Submergent, Emergent Plant Species: ______

Comments/Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

Page ______ of ______

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No. ______

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ______________________________

____

LANDOWNER:

NAME ______________________________

ADDRESS ______________________________

TELEPHONE NUMBER ______________________________

LANDOWNER CONTACTED BY:

TELEPHONE ________

MAIL ________

VISIT ________

DATE OF CONTACT:

____

ISSUE(S) TO DISCUSS:

____

____

____

____

____

____

____

REMARKS:

SKETCH MAP:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees..

CONIFEROUS: forest is composed of 80% or more coniferous trees

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include *Crataegus* sp., *Cornus racemosa* and *Spirea alba*.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).
Others:
WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including Typha angustifolia and Scirpus atrovirens. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

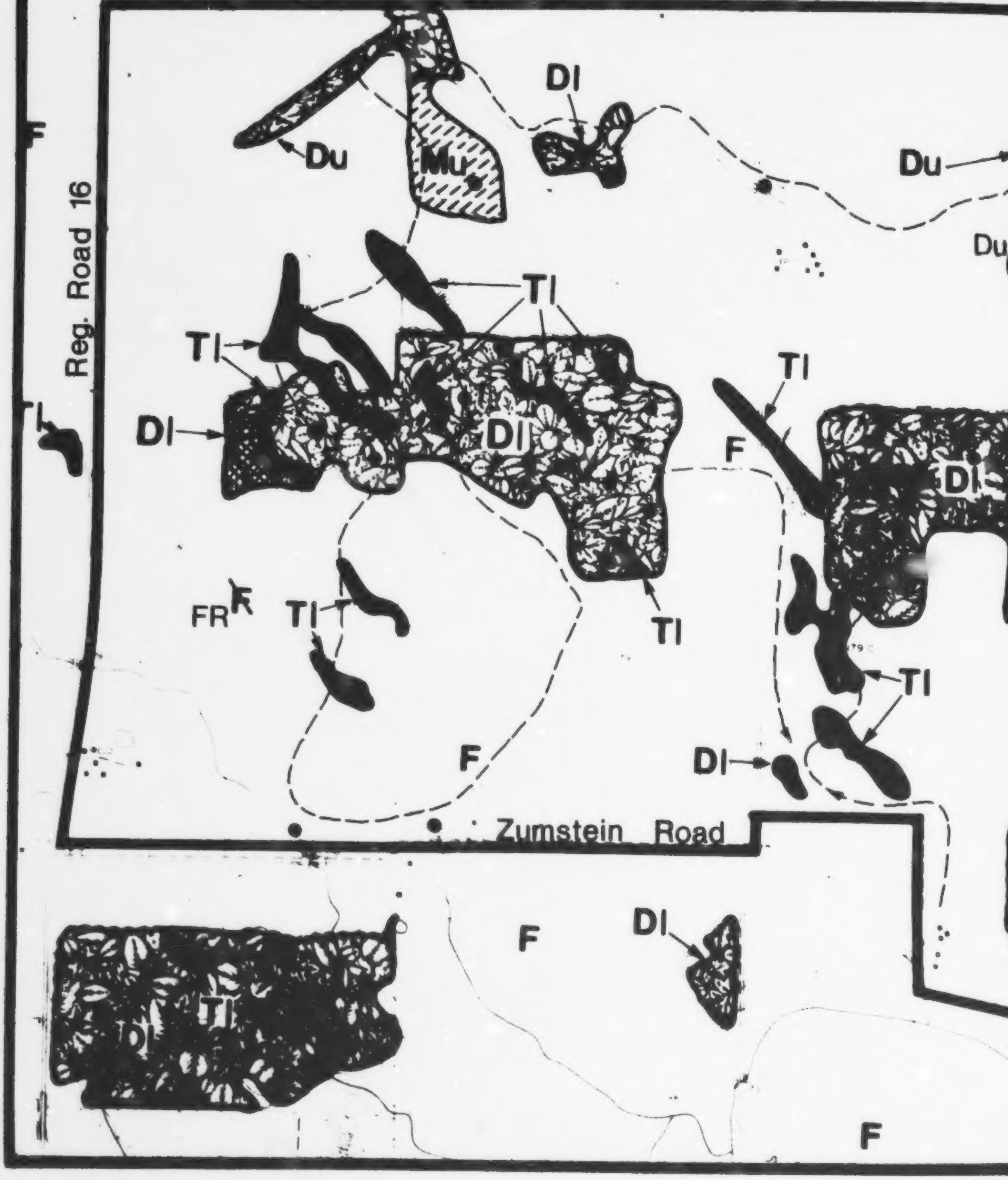
PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

Herbarium / Reseacher / Date

Habitat and Notes												
No.												
Collector												
Date												
Location												
Lot—Con.												
Township												
County												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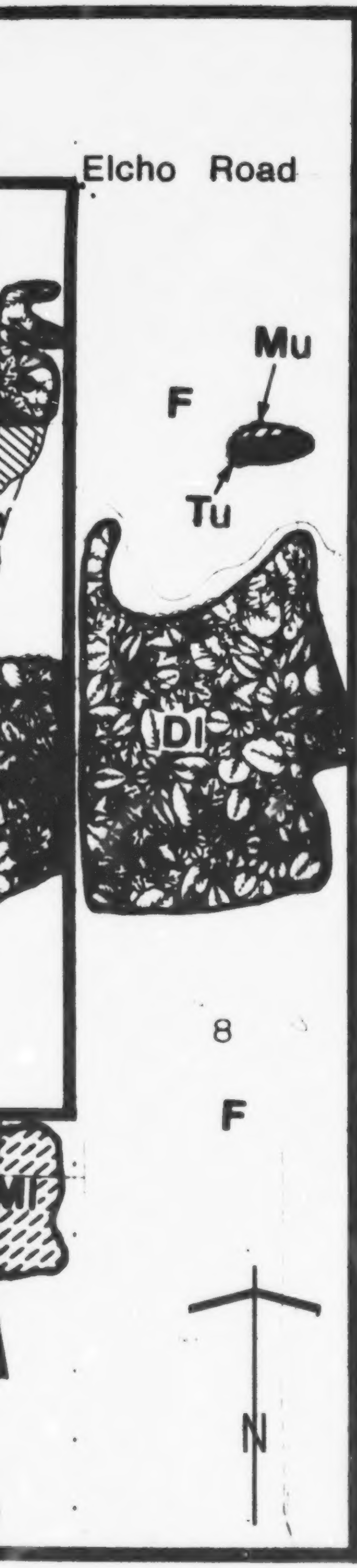

3·6

Field Map 1
Vegetation Mapping
LF-3C-01

Legend

●	Proposed Sample Points	
- — -	Proposed Fieldwork Transect	
	Changes In Mapping	
▨	Add Habitat	
▩	Delete Habitat	
~~F~~ FR	Changed Designation	
D	Deciduous	Vegetation Cover Types
C	Coniferous	
M	Mixed	
F	Field (cultivated or pasture)	
H	Hedgerow (major)	
■	Thicket	
l	Lowland	Cover Type Descriptors
u	Upland	
6.2	Significant Environmental Unit (SEU)	

Scale 1:10,000

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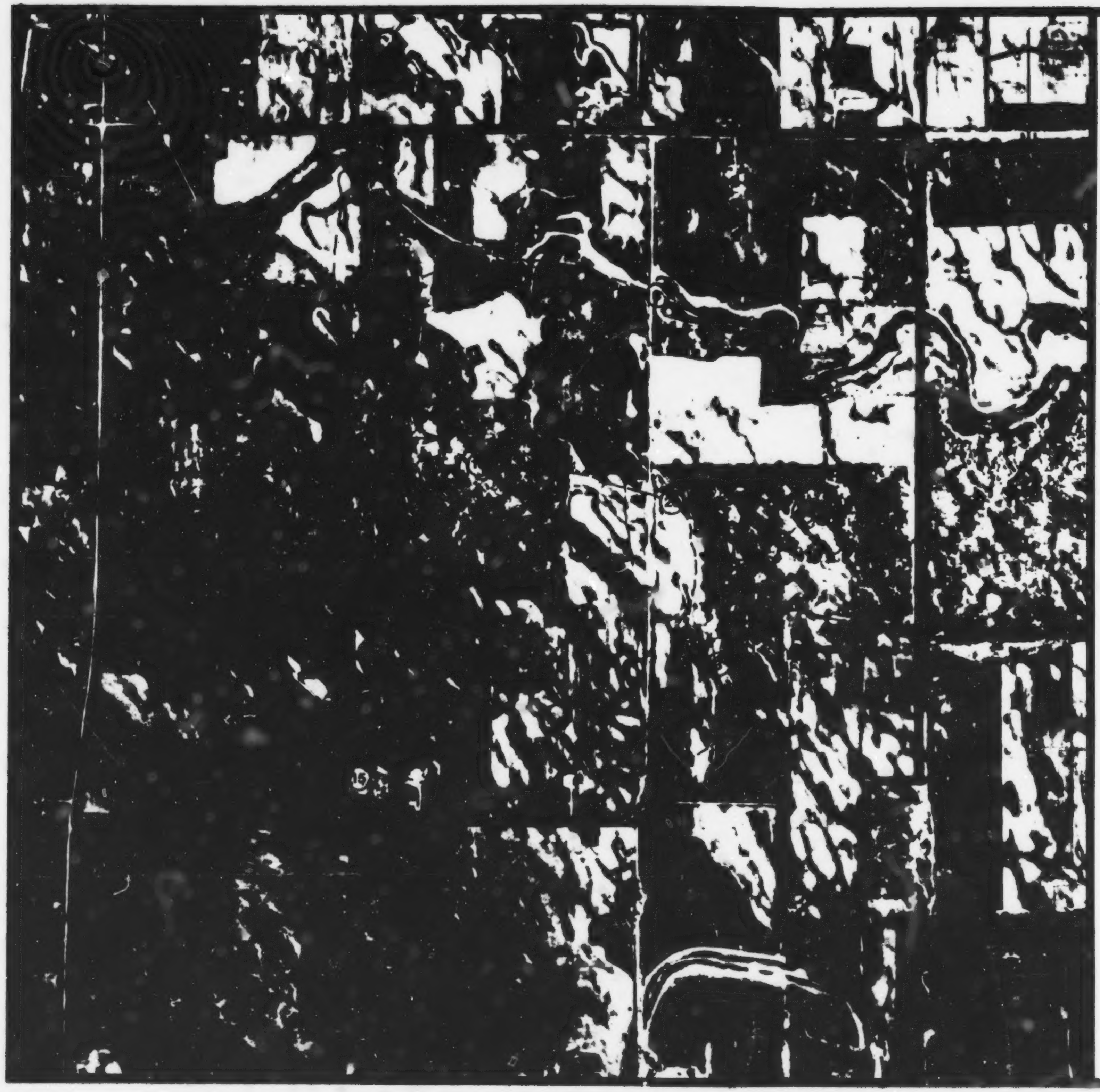

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Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥	Field Observation Station (example)
P6 →	Photograph And Direction Taken
---	Transect Followed In Field

MAP NOTES

Scale 1:10,000

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Number/
Numéro

2

SITE SELECTION PROCESS PHASE 4A:
TECHNICAL APPENDIX LF-9C -
EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee Associates Limited

Gartner Lee Associates Limited

Consulting Engineering
Geologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex-06-986278

September 6, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West,
11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix LF-9C - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site LF-9C.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly
GARTNER LEE ASSOCIATES LIMITED

for E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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BIOLOGICAL RESOURCES
STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr. - Associate and Senior Biologist of GLAL - Report Review

Kenneth Dance, M.Sc. - Associate and Senior Biologist of GLAL - Report Writing and Project Management

Thomas Hilditch, B.Sc.,Agr. - Biologist of GLAL - Data Collection

Donald Fraser, M.Sc. - Biologist of GLAL - Site Report Preparation

Wayne Weller, M.Sc. - Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site LF-9C and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Six natural vegetation cover types occur on the site, including examples of both upland and lowland deciduous forest. No special vegetation associations or Significant Environmental Units are present.

A total of 290 plant species is known from Site LF-9C, of which six are considered rare. Wildlife related data indicate the presence of 49 bird species, 14 mammals, seven reptiles and amphibians and one fish. Two bird species, two mammal species and one reptile species are considered rare.

Forestry related activities include fuelwood harvesting and maple syrup extraction. Some mammal trapping takes place, however hunting is a minor activity. Pike spawning runs occur during the spring but fishing activity is light.

Portions of three Significant Environmental Units occur within the LF-9C site vicinity. Pike spawning occurs in Sucker Creek and an unnamed tributary of the Welland River.

One rare plant species, two rare mammals and one rare reptile have been recorded in the site vicinity.

1.0 INTRODUCTION

1.1 BACKGROUND

The Ontario Waste Management Corporation (OWMC) is involved in a five-phase process for the selection of a siting option for facilities to treat liquid industrial and hazardous wastes. This process has incorporated input from a number of areas of expertise including agriculture, biology, hydrogeology, socioeconomics and transportation.

At the end of the third phase of the site selection process, eight candidate sites within the Golden Horseshoe region of southern Ontario were identified (OWMC 1984). Biological factors developed to fulfill OWMC's goal of minimizing environmental impact were among several factors used in selecting the eight candidate sites. Gartner Lee Associates Limited completed the technical input for biology as reported in "Site Selection Process, Phase 3B: Selection of Candidate Sites - Biology" (GLAL 1984g). In that report, Site LF-9C was thought to possess moderate biological constraints.

This report is a technical appendix to "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology" that documents and interprets field data and available biological information for Site LF-9C. It serves as a data base for comparing the eight candidate sites in the facility siting selection process.

1.2 SCOPE AND OBJECTIVES

As noted earlier, the previous Phase 3B evaluation of Site LF-9C was based primarily on existing data. For this Phase 4A assessment, the existing data base has been up-graded where possible and field work has been conducted on the site. The sampling and analytical elements of the program have been designed to meet study objectives and to provide an adequate basis for site comparisons.

Objectives of the Phase 4A biology study are:

- to describe existing biological conditions, on-site and in the site vicinity;
- to refine and confirm the Phase 3B data base through contact with pertinent agencies, experts and the public for both the site and site vicinity, and through field work on-site;
- to determine the level of constraint associated with biological resources;
- to assess the sensitivity and significance of biological resources; and
- to provide the Site Selection Team with biological assessments to use in refining site boundaries and in the siting option comparison.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The bulk of the existing biological information for Site LF-9C is summarized on two maps and in 11 tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

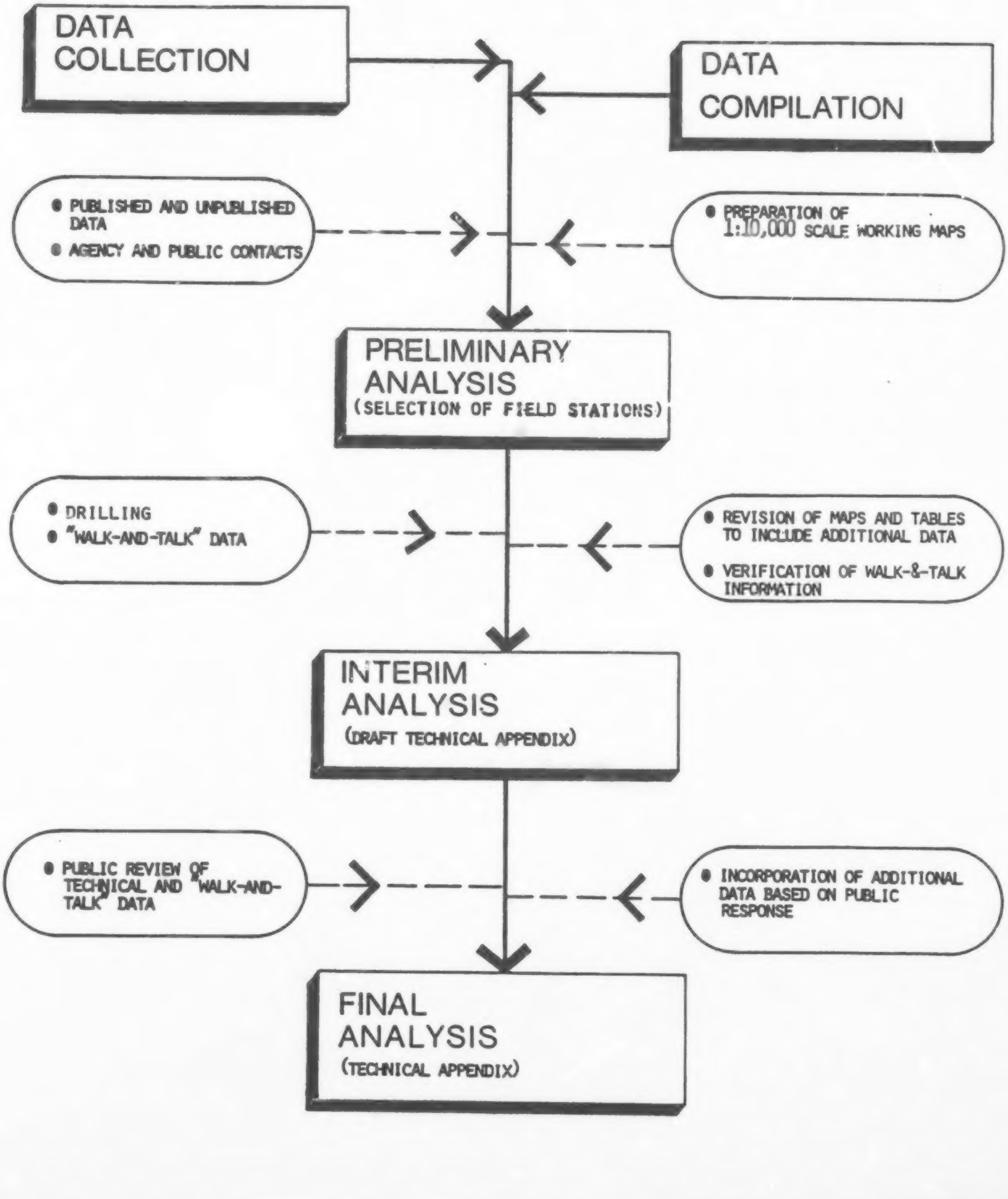
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
PUBLISHED AND UNPUBLISHED DATA
AGENCY AND PUBLIC CONTACTS
PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS
(SELECTION OF FIELD STATIONS)
DRILLING
"WALK-AND-TALK" DATA
REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS
(DRAFT TECHNICAL APPENDIX)
PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS
(TECHNICAL APPENDIX)

Government reports on vegetation and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Niagara Peninsula Conservation Authority and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site LF-9C are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984c), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

An effort was made to verify important features identified prior to field work.

Field studies on Site LF-9C were conducted on September 11 and 12, 1984. Other visits to the site by GLAL biologists occurred on May 15, June 25, July 30, November 5, and December 4, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site LF-9C citizens group on July 30, 1984 and January 30, 1985.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 9.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the LF-9C site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Niagara, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete evidence such as a photograph and/or specimen, and the

potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 9 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences discounted during the preliminary status assessment were not dealt with further. Two of the most common reasons for exclusion were incorrect identifications and changes in status as a result of more recent information.

For example, reports of Mockernut Hickory (Carya tomentosa) from the site vicinity are considered erroneous since there are no known specimen records of this species from Ontario. Neither Meyers (1984b) nor Ambrose (pers. comm. 1984) believe that the Mockernut Hickory occurs in Canada.

Swamp White Oak (Quercus bicolor) was originally designated as rare in Ontario and Canada by Argus and White (1977). A recent status review by Ball (pers. comm. 1984) has indicated that on the basis of its widespread distribution in southern Ontario, Swamp White Oak should no longer be accorded a rare status. This change will be reflected in a forthcoming publication of the Atlas of Rare Vascular Plants of Ontario Program.

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to species which utilize Site LF-9C and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

Further public meetings to review the preliminary biological information were held on December 4, 1984 and January 30, 1985. Additional data resulting from public responses were incorporated in the final report.

This technical appendix represents the interpretation of biological features and biological resource use at Site LF-9C to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A" Selection of a Preferred Site(s) - Biology".

3.0 SETTING

3.1 REGIONAL SETTING

Site LF-9C is situated in the central portion of the Niagara Peninsula, roughly midway between Hamilton and Fort Erie. Its position relative to the other seven OWMC Candidate Sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within the acquisition boundaries portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It covers 135 ha and includes Lot 18 and part of Lot 17, Concession 3 in West Lincoln Township, Regional Municipality of Niagara. It is bounded on the north by Highway 20, on the east by Schram Road and on the south by Vaughan Road. The site is approximately 20 km southwest of St. Catharines, and 35 km southeast of Hamilton. It is about 3.0 km northeast of Wellandport, 6.0 km east of Bismarck and 2.0 km northwest of the Welland River at its closest point. Regional access is gained via the Queen Elizabeth Way and south following provincial and regional roads.

Site LF-9C is located on a portion of the Haldimand Clay Plain. The terrain is generally flat, although a number of shallow, poorly drained depressions occur on the site, some of which contain standing water throughout much of the year.

The site is bisected by an unnamed tributary of the Welland River which drains from north to south.

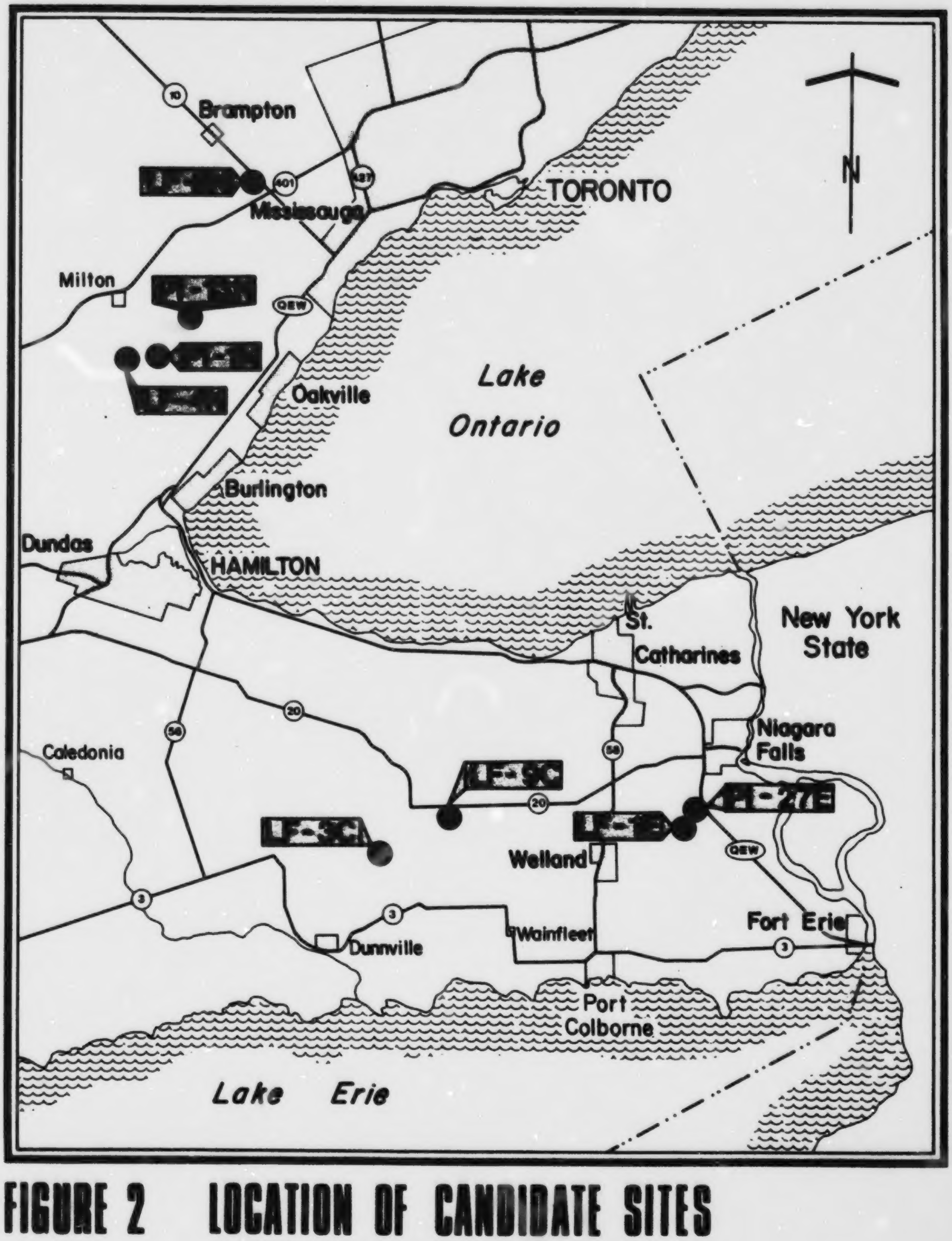

Brampton
10
401
427
Mississauga
TORONTO
N
Milton
QEW
Oakville
Lake
Ontario
Burlington
Dundas
HAMILTON
St.
Catharines
New York
State
20
56
58
Niagara
Falls
Caledonia
LF-9C
PI-27E
LF-3C
Welland
QEW
3
Dunnville
Wainfleet
Fort Erie
Port
Colborne
Lake Erie

FIGURE 2 LOCATION OF CANDIDATE SITES

Miles 8
0
8
16
Kilometres 10
0
10
20

4.0 EXISTING
BIOLOGICAL RESOURCES - SITE

Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

4.1 OVERVIEW OF SITE BIOLOGY

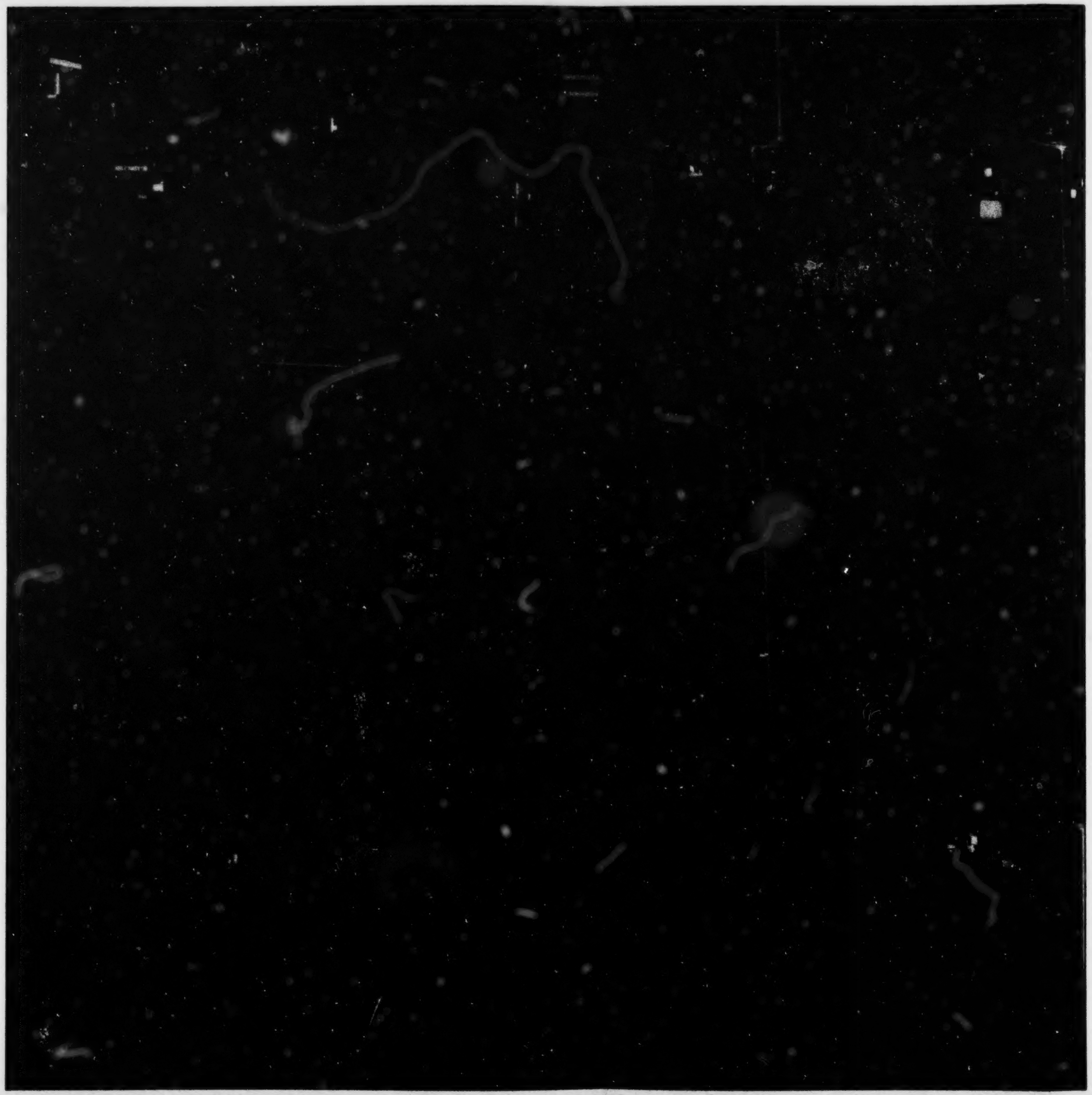
A small woodlot occurs on the western portion of the site (Figure 3) and occupies approximately 10% of the site area. The dominant vegetation in this woodlot is described in Section 4.2.2.

Smaller pockets of natural vegetation, primarily marsh and lowland thicket habitat, occur on the site. Many are associated with wet sloughs and the margins of an unnamed creek. These thickets are characterized by a dense shrub cover.

Forty-nine bird species have been recorded within the acquisition area, 42 of which likely utilize the area for nesting purposes. Fourteen species of mammals, seven species of reptiles and amphibians, and one fish have also been recorded from the site.

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated into Section 4.2.2.



OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

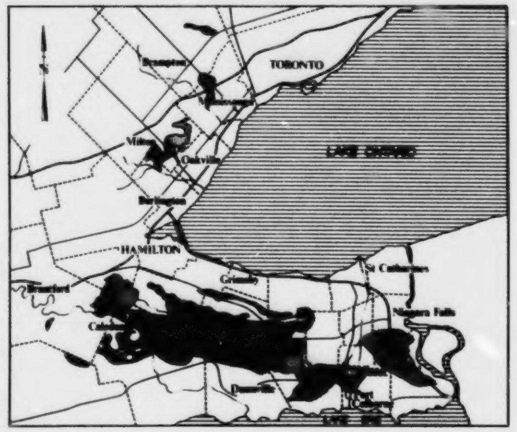
Rare Species Location

ANIMALS	PLANTS
Oo Orchard Oriole	Qp Pin Oak
	Hs Big Shellbark Hickory
	Sa Southern Arrow-wood
	T Tupelo

Pike Spawning Areas

Phase 3B Acquisition Boundary

Key Map: LF-9 Central


TORONTO
Brampton
Milton
Oakville
Burlington
LAKE ONTARIO
HAMILTON
Grimsby
St Catharines
Niagara Falls
Brantford
Caledonia
Dunnville
N

N

Scale Bar 500 0 500
250 0 250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 **Figure 3**

4.2.1 SPECIES LIST:

A total of 290 plant species has been recorded on Site LF-9C. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Six natural vegetation associations are present on Site LF-9C. Cropland and unclassified land are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under four major cover type headings:

Forest

The dominant forest represented on the site is lowland deciduous, occupying approximately 7 hectares. It occurs in conjunction with upland deciduous woods in patches, primarily in the northwest portion of the site. The pattern of distribution of these associations is strongly influenced by the existing slough-ridge topography.

The upland deciduous component occupies approximately 3 hectares.

The lowland deciduous forest is dominated by Swamp White Oak, American Elm (*Ulmus americana*), Red Maple (*Acer rubrum*) and Black Willow (*Salix nigra*).

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE LF-9C

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Deciduous Forest	3
Lowland Deciduous Forest	7
Lowland Shrub Thicket	3
Recently Disturbed Field	38
Old Field	<1
Marsh	9
Other	
Cropland	71
Unclassified	3
TOTAL	135

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting the total of all other vegetation types from the total area of the site.

The upland deciduous component is dominated by Sugar Maple (Acer saccharum), American Beech (Fagus grandifolia), White Oak (Quercus alba) and Red Oak (Quercus rubra).

Thicket

Lowland thicket, occupying approximately 3 hectares of the site, is found in association with the wet and wet-mesic sloughs.

The dominant shrub species found are Buttonbush (Cephalanthus occidentalis), Winterberry (Ilex verticillata), Gray Dogwood (Cornus racemosa) and Narrow-leaved Meadowsweet (Spirea alba).

Marsh

Numerous wet and wet-mesic sloughs are dominated by marsh vegetation. The marsh component occupies approximately 9 hectares of the site.

The dominant robust emergent is Narrow-leaved Cattail (Typha angustifolia). Narrow-leaved emergents include Sedges (Carex lupulina, C. tribuloides and C. lacustris) and Rice Cut Grass (Leersia oryzoides). Swamp Smartweed (Polygonum coccineum) is the dominant rooted, floating species present.

Field

A minor component of old field (<1 hectare) is present in the northwest corner of the site. It is dominated by native herbaceous plants such as Canada Goldenrod (Solidago canadensis) and New England Aster (Aster novae-angliae).

Recently disturbed field, occupying 38 hectares, is dominated by Canada Blue Grass (Poa compressa), Quack Grass (Agropyron repens) and Common Ragweed (Ambrosia artemisiifolia), all non-native taxa.

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS:

Special associations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distrbution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

No special vegetation associations or SEUs are found on Site LF-9C. The slough-ridge topography and related vegetation associations are common on the Haldimand Clay Plain. Pockets of mature woods similar to those noted on the site occur in other locations in Niagara Region.

4.3. FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Forty-nine bird species, 14 mammal species, seven reptile and amphibian species and one fish species have been recorded on Site LF-9C. Master species lists are presented in Tables 6 through 9.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

An unnamed intermittent drainage channel flows from north to south through the site. This channel and other low-lying areas in fields support marsh vegetation. These units cover approximately 9 hectares. There are no permanent streams on the site.

There are two ponds in the wooded areas near the western margin of the site.

A number of small farm ponds are associated with buildings around the perimeter of the site.

Frogs, turtles, aquatic furbearers and aquatic birds may use the aquatic habitat present. Northern Pike (*Esox lucius*) runs have been reported in the drainage channel on site (McPherson, *pers. comm.* 1984) and this stream supports Muskrat (*Ondatra zibethicus*) populations.

4.3.3. EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Six natural vegetation cover types occur on Site LF-9C. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site LF-9C cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

A large portion of Site LF-9C (71 ha) is currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer (Odocoileus virginianus) and granivorous birds) as food sources, but rarely support populations of nesting birds.

Recently disturbed fields (38 ha) may provide suitable breeding habitat for a number of ground-nesting birds (e.g. Bobolink (Dolichonyx oryzivorus)) and small rodents (e.g. Meadow Vole (Microtus pennsylvanicus)). However, this vegetation cover type is more important as terrestrial wildlife habitat in later stages of plant succession.

Old field habitat, while poorly represented on Site LF-9C (<1 ha), is a potential breeding area for both ground and shrub-nesting birds such as Eastern Kingbird (Tyrannus tyrannus), Gray Catbird (Dumetella carolinensis), Yellow Warbler (Dendroica petechia), Song Sparrow (Melospiza melodia), and American Goldfinch (Carduelis tristis).

Mammals typically associated with this habitat type include Woodchuck (Marmota monax) and Eastern Cottontail (Sylvilagus floridanus).

Forests

The interface between field and forest habitats is occupied by "edge" species. Although narrow, the "edge" ecotone typically provides the greatest diversity of vegetation types and thus supports a correspondingly high number of wildlife species (Taylor and Taylor 1979).

The breeding bird community associated with "edge" species on Site LF-9C is likely an overlapping one, comprised of both field and forest dwellers. Woodlot margins are also favoured by Coyotes, Red Fox (*Vulpes vulpes*) and deer.

In contrast to upland deciduous forests, lowland deciduous forests generally contain a greater diversity of tree species but often exhibit a patchier distribution (Solomon 1977). These differences reflect the effects of periodic flooding and shifts in soil texture and layering on forest succession (Bendinger 1971).

The woodlot on Site LF-9C represents a lowland deciduous forest in an intermediate stage of succession, dominated by Swamp White Oak, Red Maple and American Elm. These species are generally tolerant of both shade and periodic flooding. The avian community associated with this forest type would be comprised primarily of insectivores (Samson 1979). Typical breeding species include Red-headed Woodpecker(*Melanerpes erythrocephalus*), Black-capped Chickadee (*Parus atricapillus*), House Wren (*Troglodytes aedon*), White-breasted Nuthatch (*Sitta carolinensis*), Eastern Wood-Pewee (*Contopus virens*), and Warbling Vireo (*Vireo gilvus*).

Hollow trees provide den sites for Opossums (Didelphis virginiana), Raccoons (Procyon lotor) and squirrels.

Thicket

Wet thickets associated with slough-ridge topography (3 ha) provide potential nesting habitat for Alder Flycatchers (Empidonax alnorum), Yellow Warblers, Common Yellowthroats (Geothlypis trichas) and Swamp Sparrows (Melospiza georgiana).

Marsh

The margins of the unnamed drainage channel on Site LF-9C support scattered patches of marsh vegetation. Robust emergents such as cattails may support nesting Red-winged Blackbirds (Agelaius phoeniceus). Muskrat populations in these wet areas may be high.

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds.

Northern Pike have been observed in spring in the unnamed creek which drains the site (McPherson, pers. comm. 1984). These are believed to be spawning runs. This run is of local significance, as pike spawning occurs in many streams which drain to the Welland River.

4.4 RARE SPECIES

4.4.1. INTRODUCTION

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation. These are indicated in Tables 5 through 9 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed in Sections 2.2 and 7.1 of this technical appendix and in "Site Selection Process Phase 4a: Selection of a Preferred Site(s) - Biology".

To make information presentation more logical, indicators for rare species are not used to divide the discussion. Rather, rare species discussions are organized by life form (animals and plants) and species. Each indicator is addressed within each species discussion.

The approximate locations of rare species occurring on the site are mapped in Figure 3 at an original scale of 1:5,000. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species where, for example, several individuals are found in close proximity to one another. Information concerning actual numbers of individuals of rare species and their on-site distribution is presented later in this Section and in Table 2.

However, it should be emphasized that existing rare species data are based on preliminary investigations. Further on-site field work could result in an increase in both the numbers and individuals of rare species.

4.4.2 RARE ANIMAL SPECIES:

Five animal species which have been reported from Site LF-9C are considered to be rare. The Eastern Bluebird (*Sialia sialis*) is nationally rare (Muir 1984) while the Orchard Oriole (*Icterus spurius*) is considered to be a rare breeding species in Ontario (Eagles and McCauley 1982). The Opossum is provincially rare (van Zyll de Jong 1983), while the Bobcat (*Lynx rufus*) is regionally rare. The Black Rat Snake (*Elaphe o. obsoleta*) is a nationally (Cook 1976), provincially (Weller 1982) and regionally (Campbell 1977) rare species.

Eastern Bluebird

A bluebird was observed on Site LF-9C in late August 1984 (Meyers 1984c). Eastern Bluebirds produce multiple broods during a single nesting season and in Ontario are known to incubate eggs well into August (James *et al*. 1976). While the timing of this observation is suggestive of possible breeding on the site, concrete evidence is presently lacking.

Throughout much of its range, the Eastern Bluebird has experienced a pronounced population decline in recent years (Tate and Tate 1982). The species was recently added to the list of rare Canadian taxa by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Muir 1984).

Sheppard (1970) describes the Eastern Bluebird as "formerly a reasonably common summer resident" which is now "quite a rarity" in localities where it was once prevalent. This trend is corroborated by preliminary (1981-1983) results of the Ontario Breeding Bird Atlas Project.

As of 1983, no breeding evidence for the Eastern Bluebird was recorded in any of the 10 km square units containing or adjacent to Site LF-9C (Ontario Breeding Bird Atlas 1984).

Orchard Oriole

Meyers (1985a) observed an Orchard Oriole in suitable breeding habitat (dry oak woods) on the west side of the site.

This species is considered to be a rare breeding species in Ontario (Eagles and McCauley 1982), where it reaches the northern limit of its distribution. According to James *et al*. (1976) the Orchard Oriole is an uncommon and local summer resident in the southern portion of the province.

In Niagara R.M. there are a number of historical nest records for this species: Fort Erie in 1904 and 1946 (Beardslee and Mitchell 1965), Mohawk Point (Mitchell 1956) and Vineland from 1928-1945 and 1950 (Sheppard 1970). Few recent nest records exist. As of the end of 1984, breeding by Orchard Orioles has been confirmed in only two of 31, 10 km square units censused for the Ontario Breeding Bird Atlas in Niagara Region (Cadman 1984).

Opossum

Opossums are reported to occur on Site LF-9C (Meyers 1984a; West Lincoln Task Force Against Toxic Waste 1984) but specific locations are unknown.

The present distribution of this species in southern Ontario is confined to the north shore of Lake Erie, the Niagara Peninsula and the Thousand Islands region (van Zyll de Jong 1983). Of sporadic occurrence, Opossums appear to have invaded Ontario from Michigan and New York (Peterson and Downing 1956). They are almost exclusively restricted to the Deciduous Forest Region (Rowe 1972), where they are generally able to withstand moderate winter conditions.

Although rare throughout much of southern Ontario, at present this marsupial appears to be locally common in Niagara R.M. The regional status of the Opossum may change, however, as populations tend to undergo rapid fluctuations in response to changing climatic conditions (Hamilton 1958).

Bobcat

According to Meyers (1984a) there is a recent, "unverified" report of a Bobcat from Site LF-9C. A shy species which is seldom seen, the Bobcat may still occur in som areas of Niagara R.M.

The Bobcat is able to adapt to changing environmental conditions, a characteristic that has led to its occupancy of agricultural lands. Evidence suggests that Bobcats have extended their distribution into Ontario from the south since the turn of the century and continue to exhibit a northward range extension (Banfield 1974).

Black Rat Snake

Meyers (1984a) contends that the "large black snakes" occasionally observed on Site LF-9C by local landowners may be Black Rat Snakes. Although still relatively common in the Rideau Lakes region of Eastern Ontario (Campbell 1977), there are indications that this disjunct population may also be declining (Curran 1971). The species is "apparently now rare in southwestern Ontario" (Cook 1970), an opinion which has prompted Weller (1982) to consider it "rare and endangered" on a province-wide basis. Cook (1976) believes that the Black Rat Snake is threatened in Canada.

Campbell (1977) cites a number of "convincing" reports from Niagara R.M. since 1931, including a 1969 sight record from the St. Ann's area.

A species which favours oak-hickory-elm forests (Fitch 1963), Black Rat Snakes appear to be highly sensitive to lumbering activities associated with these habitats.

4.4.3 RARE PLANT SPECIES

Four of the six rare plant species found on Site LF-9C are considered to be rare in Ontario and Canada. Pin Oak (*Quercus palustris*), Tupelo (*Nyssa sylvatica*) and Big Shellbark Hickory (*Carya laciniosa*) are rare according to Argus and White (1977), while Southern Arrow-wood (*Viburnum recognitum*) is rare according to Argus and Keddy (undated).

The fifth rare species, Blunt-leaved Sandwort (*Arenaria lateriflora*), is rare and endangered in the Niagara Frontier Region (Zander and Pierce 1979).

The sixth, Spray Aster (Aster pilosus), is considered to be rare in the Niagara Frontier Region (Zander and Pierce 1979).

Relative population sizes and distribution patterns of rare plant species on Site LF-9C were determined from field observations conducted by Gartner Lee Associates Limited and other sources (Meyers 1984a, 1984b, 1985a, 1985b; Webber 1985). Numbers of individuals were noted within field study plots. These totals were supplemented by observations made between sampling stations. Known localities of rare plants are plotted on Figure 3.

Pin Oak

Four specimens were encountered during GLAL field work, all at one sampling station. The station lies within lowland deciduous forest near a marsh-dominated slough. Meyers (1985b) reports a Pin Oak from the largest woodlot on site. Known locations of this species are noted on Figure 3.

The provincial and national status of Pin Oak is under review. It is not considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

Tupelo

This species prefers low woods and pond margins. It was reported by (Meyers 1984c, 1985a, 1985b) and Webber (1984a) from wet slough habitat in the northwest woods on the site (Figure 3).

Tupelo is considered rare in Ontario and Canada (Argus and White 1977) but not in the Niagara Frontier Region (Zander and Pierce 1979). Its status is also currently under review by the Atlas of Rare Vascular Plants of Ontario Program in Ottawa.

Big Shellbark Hickory

Meyers (1984c) reports the occurrence of several hickories on the eastern edge of the northwest woodlot, which he suggests may be Big Shellbark Hickory. If confirmed, this record would represent a westward range extension in the Niagara Peninsula area of Ontario (Meyers 1984b).

Webber (1984a) suggests that the hickories in question most resemble Pignut Hickory (*Carya glabra*). As neither Meyers nor Webber verified the species, we consider the occurrence to be Big Shellbark Hickory, the more significant of the two.

Blunt-leaved Sandwort

The distribution of this species on the site is unknown. It was reported by Webber (1984a). It is generally found in open, moist woods.

The species is not designated as rare in Ontario by Argus and White (1977), however it is rare and endangered in the Niagara Frontier Region (Zander and Pierce 1979). Endangered flora in the Niagara Frontier Region are defined by Zander and Pierce (1979) as "very rare and easily extirpated through picking or habitat disturbance". Blunt-leaved Sandwort is not an endangered species in Ontario and thus is not protected under Provincial law.

Spray Aster

This species was recorded in upland deciduous forest habitat on Site LF-9C by Webber (1984a). It is considered to be rare in the Niagara Frontier Region (Zander and Pierce 1979). The aster was recently delisted from the Atlas of Rare Vascular Plants in Ontario and included with a more common variety for taxonomic reasons (Argus and Keddy, undated; Semple, *pers. comm.* 1984).

Southern Arrow-wood:

Southern Arrow-wood appears to be widely distributed in the wet wooded areas on the site, where it is often associated with Swamp White Oak (Meyers 1985a, 1985b). Five specimens were recorded during GLAL field work, one at each of five stations (Figure 3).

Although considered rare in Ontario and Canada (Argus and Keddy, undated) Southern Arrow-wood is not accorded this status in the Niagara Frontier Region (Zander and Pierce 1979).

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered as indicators of this factor are: foresty, trapping, hunting and fishing. Resource use has been identified as a biological factor, the rationale for which is provided in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.5.1 FORESTRY:

Forestry potential refers to wooded areas which could be commercially logged for sawlogs, veneer logs and fuelwood in the short term.

On-site assessments of forestry potential were made by GLAL on the basis of the following criteria: size of woodlot, species composition, age and size of trees, accessibility and aspect.

Forestry potential on the site is limited. The 10 hectares of woods on site are fragmented, the largest block being less than 7 hectares in size. Seventy percent of the woods are lowland deciduous, dominated by Swamp White Oak, Red Maple and American Elm. While of some value, these lowland species are generally highly defective, difficult to manage and respond poorly to thinning techniques (Ontario Ministry of Natural Resources 1974, 1978).

All of the woods are generally at a pole stage of development with very limited sawlog or veneer log potential. Fuelwood thinning is the activity most suited to the improvement and harvesting of woods on Site LF-9C.

The potential for maple syrup operations is limited by the small size and distribution of Sugar Maple trees present.

Current forestry activities on Site LF-9C are restricted to fuelwood (Melon, *pers*. *comm*. 1984; Kszan, *pers*. *comm*. 1984) and maple syrup (Kszan, *pers*. *comm*. 1984) extraction. Neither appear to be of major regional significance. The lowland deciduous woodlot on site does not exhibit any signs of having been recently cutover.

4.5.2 TRAPPING:

In 1982-83, 635 Muskrats and 70-80 Raccoons were trapped in the area containing Site LF-9C (McPherson, *pers*. *comm*. 1984) It is not known how many animals were captured on the site proper.

Red Fox and American Mink (*Mustela vison*) were also trapped in 1982-83, although neither comprised a significant portion of the total harvest (McPherson, *pers*. *comm*. 1984). The presence of wet sloughs in spring makes Site LF-9C an "excellent" area to trap Muskrat (McPherson, *pers*. *comm*. 1984). Trapping is not regionally significant, as the average annual yield on site is comparable to that recorded in the surrounding areas (McPherson, *pers*. *comm*. 1984).

4.5.3 HUNTING:

Although Site LF-9C is described as a "good deer hunting area" (OMNR 1984a), there are no statistics available to substantiate this claim. White-tailed Deer, Eastern Cottontails, Grey Squirrels (*Sciurus carolinensis*), Ruffed Grouse (*Bonasa umbellus*) and a variety of waterfowl species are hunted on Site LF-9C. According to McPherson (*pers*. *comm*. 1984), LF-9C and environs is recognized throughout that part of the Niagara Peninsula as one of the best inland waterfowl and deer hunting areas. However, no specific harvest data were found to corroborate this contention.

4.5.4 FISHING:

Although Northern Pike reportedly spawn in the unnamed creek on Site LF-9C (McPherson, *pers. comm.* 1984), the significance of this watercourse as a sport fishery has not yet been documented (OMNR 1984b).

4.6 SUMMARY - SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to present the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 2 Summary Site Biological Resources LF-9C

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURCE USE			
Name	No. of Individuals	Distribution	Species List	Aquatic Habitat	Terr. Wildlife Habitat	Special Habitats	Species List	Area Nat. Vegetation	No. of Cover Types	Special Associations/SEUs	Forestry	Trapping	Hunting	Fishing
• Eastern Bluebird	1 reported	unknown	• 49 bird species • 14 mammal species • 7 amphibian and reptile species • 1 fish species	• Unnamed Creek draining into Welland River	• 6 natural vegetation cover types • 7 ha of lowland deciduous forest • some thicket, marsh and old field habitat • habitat for forest, edge, wetland and field communities.	• locally significant pike spawning	• 290 plant species	• Upland Deciduous Forest 3 ha • Lowland Deciduous Forest 7 ha • Lowland Shrub Thicket 3 ha • recently disturbed Field 38 ha • Old Field > 1ha • Marsh 9 ha	• 6 natural vegetation cover types, see list to left	• None	• some fuelwood harvest • maple syrup • limited forestry potential (primarily fuelwood material)	• muskrats and raccoons primarily • one trapper	• upland game and waterfowl • Minor activity	• Pike spawning • Minor significance
• Orchard Oriole	1 reported	unknown												
• Opossum	unknown	unknown												
• Bobcat	1 reported	unknown												
• Black Rat Snake	unknown	unknown												
• Pin Oak	4 found; 1 additional tree reported	lowland deciduous-west side of site												
• Tupelo	many reported	northwest woodlot												
• Big Shellbark Hickory	2 or 3 individuals reported	eastern edge of second largest lowland deciduous woodlot												
• Southern Arrowwood	5 found; many reported	widely distributed in wet wooded areas												
• Blunt-leaved Sandwort	unknown	unknown												
• Spray Aster	unknown	in upland deciduous woods												

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

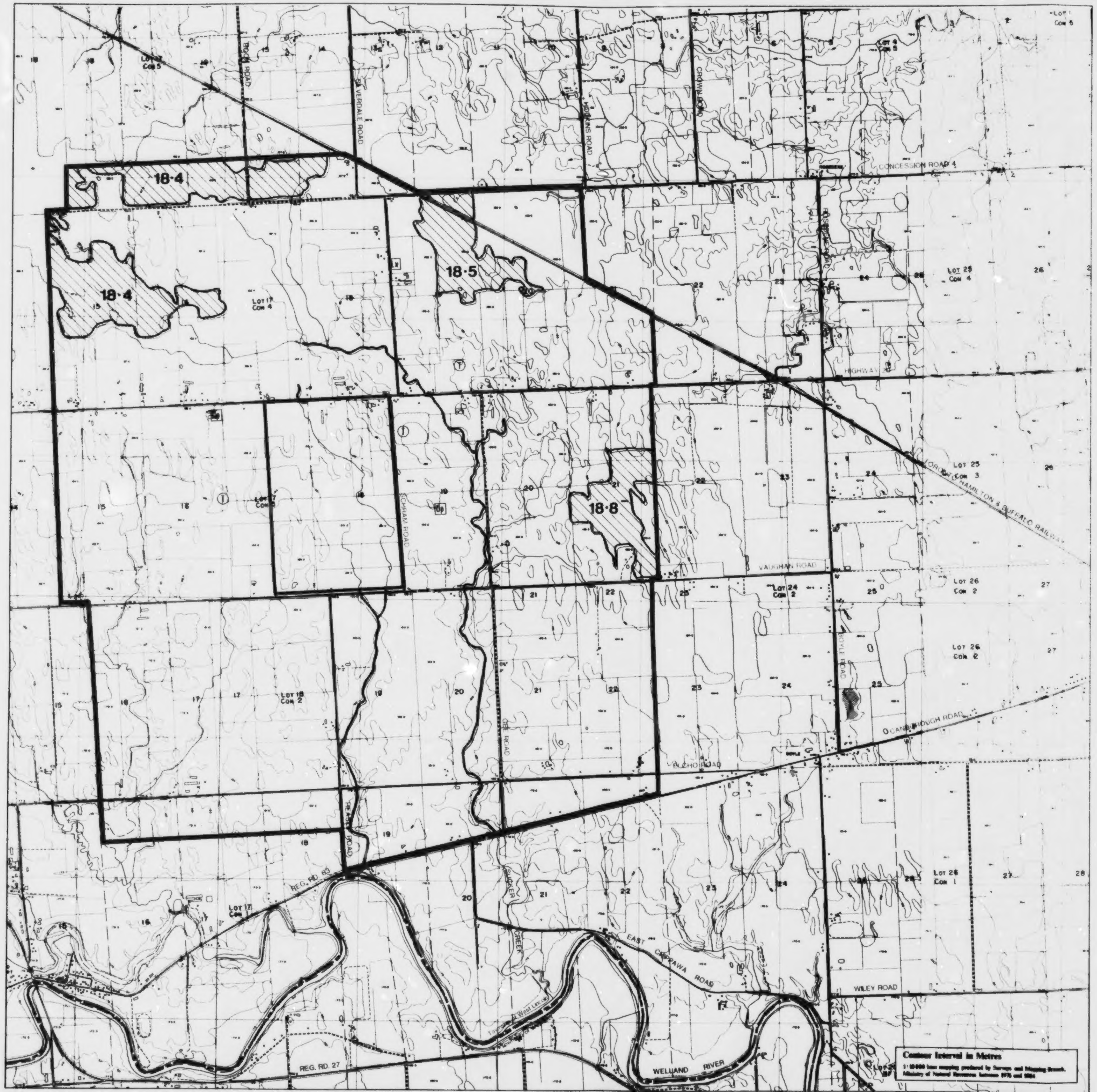
5.1 INTRODUCTION

Site vicinity is defined as the area which lies outside Site LF-9C within approximately a 2.0 km radius of the acquisition boundary. The LF-9C site vicinity boundary is delineated in Figure 4 and referred to as the "Site Vicinity Study Area Boundary".

A total of 38 plant species has been recorded in the site vicinity (Table 5). Seventy-five of the 77 bird species known from the site vicinity are permanent or summer residents which possibly breed in the area (Ontario Breeding Bird Atlas 1984; Table 6). An additional 12 species of mammals, five species of reptiles and amphibians, and one species of fish are reported to occur in the site vicinity (Tables 7 through 9, respectively).

In general, the pattern of vegetation cover types found throughout the site vicinity is similar to that which exists on the site itself.

Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations, and rare species.


18·4
18·5
18·8
CONCESSION ROAD 4
HIGHWAY
TORONTO HAMILTON & BUFFALO RAILWAY
VAUGHAN ROAD
CANBOROUGH ROAD
ECHO ROAD
WILEY ROAD
EAST CANBORO ROAD
REG. RD. 63
REG. RD. 27
WELLAND RIVER
Lot 17 Con 4
Lot 25 Con 4
Lot 25 Con 3
Lot 24 Con 2
Lot 26 Con 2
Lot 18 Con 2
Lot 26 Con 1
Lot 17 Con 1
Contour Interval in Metres

Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS	PLANTS
Op Opossum	Ⓣ Tupelo
Lx Lynx	

Significant Environmental Units

▨ ESAs, ANSIs and AIBRs

13·3 Unit number
— Candidate area number

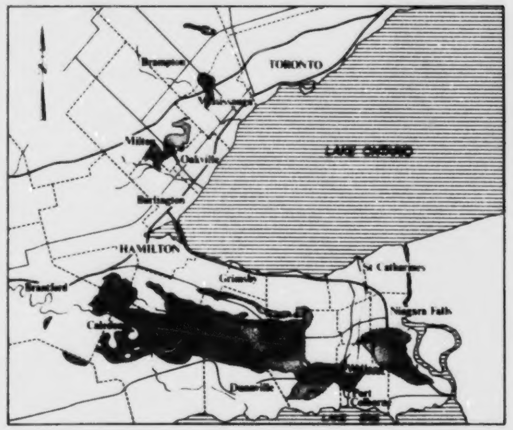
Significant Fish and Wildlife Features

〰 Pike Spawning Areas

—— Phase 3B Acquisition Boundary
▬▬ Site Vicinity Study Area Boundary

Key Map: **LF-9 Central**

Lot 18 and Part of Lot 17; Concession III; Township of West Lincoln; formerly in the Township of Gainsborough


Brampton
TORONTO
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
Brantford
Grimsby
St Catharines
Niagara Falls
Dunnville

1000 feet 0 1000
500 metres 0 500

EXISTING BIOLOGICAL CONDITIONS, PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Large portions of three SEUs occur within the LF-9C site vicinity (Figure 4). Areas of the two natural vegetation cover types represented in SEUs are noted in Table 3.

The eastern end of the Silverdale Woodlot (SEU 8-4), also known as the St. Ann's Slough Forest (Macdonald 1980), occupies the northwestern corner of the site vicinity. It is situated approximately 500 m from Site LF-9C at its closest point. The physiography of this 300 ha woodlot is representative of the linear slough ridge pattern found throughout the Haldimand Clay Plain. The upland ridge areas support a rich forest association dominated by oak, maple and beech. Several tributaries of Sixteen Mile Creek and the Welland River flow through or originate in this SEU.

The Silverdale Woodlot satisfies five of the ESA criteria established by Brady et al. (1980): the area represents a headwater, is large in areal extent, contains rare species, supports an unusually high diversity of biological communities, and exhibits high quality wildlife habitat.

TABLE 3: AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, LF-9C

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
SEU	
Deciduous Forest	144
Thicket	<1
Other	
Deciduous Forest	101
Thicket	3
Wetland	1
Successional Field	6
TOTAL	256

* Areas are approximate and are rounded to whole numbers.

This area is also recognized as an ANSI of "provincial significance" (Macdonald 1980).

Sucker Creek (SEU 18-5) is a flat poorly-drained woodlot, the southern end of which extends into the northeast corner of the site vicinity to within approximately 750 m of Site LF-9C. It fulfills four ESA criteria (Brady _et al_. 1980). Sucker Creek is a headwater area, supports rare species, and contains a biotic community which is indicative of both high diversity and high quality.

The east-central portion of the site vicinity is occupied by Davison's Bush (SEU 18-8), also referred to as the Northwest Boyle Forest (Macdonald 1980). This 65 ha area is comprised of an open marsh surrounded by an upland forest association of oak, maple and beech. It is situated approximately 1.25 km east of Site LF-9C. Davison's Bush has been designated as both an ESA (Brady _et al_. 1980) and an ANSI of significance other than regional or provincial (Macdonald 1980).

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

Fish Spawning Areas

Sucker Creek, located to the north and east of the site, has a spring pike run (McPherson, _pers_. _comm_. 1984) which suggests that pike spawning occurs. This run has been classified as locally significant. Sucker Creek flows within 160 m of the site boundary at its closest point.

The unnamed creek which flows from the site through the site vicinity and drains into the Welland River supports a pike run of local significance, downstream from the site.

No data are available which describe the characteristics of a stream flowing south through the western side of the site vicinity into Beaver Creek.

The Welland River and Beaver Creek lie just outside the site vicinity study boundary.

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within the site vicinity which is not designated as SEU. Four natural vegetation associations are represented in the site vicinity. The approximate area of each vegetation association is indicated in Table 3. In general, the site vicinity vegetation is of similar structure and composition to that studied on Site LF-9C.

Forest

Approximately 100 hectares of deciduous woods are present outside of the SEUs in the vicinity. The woodlots are fragmented and widely scattered, varying from less than one to 47 hectares in size.

Thicket

A minor thicket component (3 ha) is represented by several small patches occurring generally within or adjacent to woodlots.

Wetland

Three small wetland pockets occur in the site vicinity, totalling 1 hectare.

Successional Field

Occupying approximately 6 hectares, this component occurs in two patches on the site.

Since no field work was conducted in the site vicinity, the significance of site vicinity natural vegetation units as wildlife habitat can only be speculated upon. Several of the woodlots found in the site vicinity are substantially larger than those found on the site itself and may harbour a greater diversity of wildlife. The wooded fragments in the northern site vicinity are part of an extensive east-west wooded complex. These woodlots may collectively function as a travel corridor for some wildlife species.

5.5 RARE SPECIES

Where known, the approximate locations of rare species occurring in the site vicinity are mapped in Figure 4 at an original scale of 1:10,000. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or twoletter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species, where, for example, several individuals are found in close proximity to one another. For information concerning actual numbers of individuals of rare species and their on-site distribution, the reader is referred to the accompanying text of Section 5.5 and Table 4.

5.5.1 RARE ANIMAL SPECIES:

Three rare animals, Opossum, Lynx (*Lynx lynx*) and Black Rat Snake, havbeen reported from the LF-9C site vicinity. The statuses of Opossum and Black Rat Snake have previously been discussed in Section 4.4.2.

Opossum

This species has been recorded in the site vicinity (Diek, *pers. comm.* 1984) and is described as a "common" inhabitant of the area (Kszan, *pers. comm.* 1985).

Lynx

According to Hallas (*pers. comm.* 1984), a female Lynx was shot in the LF-9C site vicinity in 1973 or 1974. Identification of the specimen was apparently made by Ministry of Natural Resources personnel. The female was lactating at the time of death, suggesting that she had recently given birth to a litter of kittens.

DeVos and Matel (1952) describe the Lynx as a "typical denizen of the boreal forests" which "is becoming a rare occurrence all the time, and its range is gradually shrinking". These authors trace the species' decline in Canada since about 1910 and attribute it to clearing of forests, overtrapping, the decline of Snowshoe Hare (*Lepus americanus*) populations and competition with increasing numbers of Bobcats along the southern extent of its range.

There is a fairly recent record of the Lynx from Niagara R.M. According to Sutherland (*pers. comm.* 1984) a specimen was trapped near St. David's in the late 1960s. However, although Silverdale Woods has been described as "a haven" for this species (West Lincoln Task Force Against Toxic Waste 1984), it is unlikely that any Lynx still occur there. If not extirpated, the Lynx is extremely rare in Niagara R.M.

Black Rat Snake

Meyers' (1984c) report contains a reference to the possibility that this species may occur in the LF-9C site vicinity. No details or locations are provided, however.

Carrier (pers. comm. 1984) reports the occurrence of a large snake, "longer than four feet, shiny black with a bronze underbelly" which is almost certainly a Black Rat Snake. The snake was encountered in 1981 on the Carrier property, situated several hundred metres west of the LF-9C site vicinity. According to Carrier (pers. comm. 1984), Eric Weiss, a resident of St. Ann's has killed three or four Black Rat Snakes in the past few years.

5.5.2 RARE PLANT SPECIES:

One rare plant species, Tupelo, has been recorded in the site vicinity (Beamer, C., pers. comm. 1984a, 1984b). Known locations for this species in the vicinity are plotted on Figure 4.

The significance of Tupelo is discussed in greater detail in Section 4.4.3. It is considered rare in Ontario and Canada (Argus and White 1977), but not in the Niagara Frontier Region (Zander and Pierce 1979).

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information, as summarized in Table 4, provides background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources LF-9C

FACTORS AND INDICATORS

SIGNIFICANT ENVIRONMENTAL UNITS			FISH AND WILDLIFE FEATURES OF SIGNIFICANCE		OTHER NATURAL VEGETATION	RARE SPECIES
SEUs	CRITERIA FOR DESIGNATION	DISTANCE TO SITE	FEATURE	DISTANCE TO SITE		
• 18-4 • Silverdale Woodlot (St. Ann's Slough Forest) • Brady ESA Study • ANSI of provincial significance	• headwater area • large in areal extent • rare plant species • high diversity of biological communities • high quality wildlife habitat	500m	• Locally significant pike spawning – Sucker Creek – Unnamed tributary of Welland River	– 160 m – flows from site through site vicinity	• Deciduous Forest 101 ha • Thicket 3 ha • Wetland 1 ha • Successional Field 6 ha	ANIMALS • Opossum • Lynx • Black Rat Snake PLANTS • Tupelo
• 18-5 • Sucker Creek • Brady ESA Study	• headwater area • rare plant species • high diversity of biological communities • high quality wildlife habitat	750m				
• 18-8 Davison's Bush (Northwest Boyle Forest) • Brady ESA study • ANSI of significance other than regional or provincial	• headwater area • high quality waterfowl habitat	1.25km				

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7.0 SPECIES LISTS

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general, the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 9) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins et al. 1982) and fish (Scott and Crossman 1973).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 9. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined. These are sources 10, 26, 30, and 31.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", "Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

The most current source of information concerning plant status and distribution in Niagara Region is Flora of the Niagara Frontier Region (Zander and Pierce 1979). Although prepared in New York State, the study area includes Niagara Region in Ontario. It draws upon Ontario literature and provides an accurate reflection of regional plant status.

Other background reports examined included works by Zenkert (1934) and Zander (1976) for the Niagara Frontier Region. Environmentally Sensitive Areas reports by Brady *et al*. (1980a), Ecologistics Limited (1976) and Eagles *et al*. (1980) provided additional regional perspectives for plant species distribution and status. The Vascular Plants of Norfolk County (Landon 1960) provided regional data for an adjacent area.

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reports where applicable.

Frequency and relative abundance standards are assigned to Ontario birds by James *et al*. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for a comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

Two annotated lists of the regional avifauna were relied upon heavily when determining the status of birds in the Niagara Peninsula. The geographical scope of Beardslee and Mitchell's (1965) account encompasses a large portion of neighbouring New York State, while Sheppard's (1970) treatment is confined to the Ontario side. Previous published lists (Sheppard et al. 1936; Sheppard 1939) contain references to the historical status of selected species.

In assigning status, Beardslee and Mitchell (1965) adopt the criteria and terms established by the Federation of New York State Bird Clubs in 1954. These differ somewhat from the criteria used by James et al. (1976) to determine status on a provincial level. Terms used by Sheppard (1970) to describe abundance and frequency of occurrence are not defined.

More recent information on the status of breeding birds in the Niagara Region was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April 1984, 20 species of mammals have been designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not addressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammal fauna of the Regional Municipality of Niagara. Information supplied by local naturalists and recognized authorities in the field of mammalogy was largely relied upon to determine the regional status of particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and South Wellington Counties was also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from the Niagara Region, however they do not assign status. A survey of the amphibians and reptiles of the Niagara Escarpment Planning Area (Campbell 1976) also includes references to Niagara.

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister *et al*. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species is presently protected in Ontario by "Endangered" species legislation (Ontario Government 1971; OMNR 1977). The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disporportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitative definitions of rarity could be proposed with a considerable degree of confidence. However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of Guelph, and the National Museum of Natural Sciences in Ottawa, were consulted on a number of occasions.

In cases where wildlife data were lacking, lengthy discussions were held with appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE LF-9C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
EQUISETACEAE	HORSETAIL FAMILY		
Equisetum arvense L.	Field Horsetail	29	
E. sylvaticum L.	Wood Horsetail	29	
OPHIOGLOSSACEAE	ADDER'S - TONGUE FAMILY		
Botrychium dissectum Spreng. (forms *dissectum* and *obliquum*)	Dissected Grape Fern	28,29	
OSMUNDACEAE	ROYAL FERN FAMILY		
Osmunda cinnamomea L.	Cinnamon Fern	28,29	
O. regalis L.	Royal Fern	10,28, 29	
DENNSTAEDTIACEAE	BRACKEN FAMILY		
Pteridium aquilinum (L.) Kuhn	Bracken Fern	29	
ASPLENIACEAE	SPLEENWORT FAMILY		
Onoclea sensibilis L.	Sensitive Fern	10,29	
Arthyrium felix-femina L.	Lady Fern	28,29	
Dryopteris spinulosa (Muell.) Kuntze	Spinulose Shield-fern	29	
THELYPTERIDACEAE	BEECH FERN FAMILY		
Thelypteris palustris (Salisb.) Schott	Marsh Fern	10,28, 29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
PINACEAE	PINE FAMILY		
Pinus strobus L.	White Pine	27,29	3,14,16, 15,11
Picea glauca (Moench) Voss.	White Spruce		11
Tsuga canadensis (L.) Carr.	Eastern Hemlock		11,4
TYPHACEAE	CATTAIL FAMILY		
Typha latifolia L.	Cattail	10,29 26	
ALISMATACEAE	WATER-PLANTAIN FAMILY		
Alisma plantago-aquatica L.	Water-plantain	29	
Sagittaria latifolia Willd.	Arrowhead	29	
POACEAE	GRASS FAMILY		
Bromus inermis Leyss.	Smooth Brome Grass	29	
B. japonicus Thun. ex Murray	Japanese Brome	29	
Festuca obtusa Biehl.	Nodding Fescue	29	
F. pratensis Huds.	Meadow Fescue	29	
Glyceria septentrionalis A.S. Hitchc.	Eastern Manna Grass	29	
G. striata (Lam.) A.S. Hitchc.	Fowl Manna Grass	29,10	
Poa compressa L.	Canada Blue Grass	29,10	
P. palustris L.	Fowl Meadow Grass	29	
P. pratensis L.	Kentucky Blue Grass	29	
Schizachne purpurascens (Torrey) Swallen	Purple Melic Grass	29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
Agropyron repens (L.) Beauv.	Quack Grass	29,10	
Secale cereale L.	Rye	29	
Elymus hystrix L.	Bottle-brush Grass	29	
Dathonia spicata (L.) Beauv.	Poverty Oat Grass	29	
Calamagrostis canadensis (Michx.) Beauv.	Canada Blue-joint	29	
Agrostis gigantea Roth	Redtop	29	
A. perennans (Walt.) Tuckerm.	Autumn Bent Grass	29	
A. scabra Willd.	Rough Hair Grass	29	
Cinna arundinacea L.	Stout Wood Grass	29,28 10	
Phleum pratense L.	Timothy	29	
Milium effusum L.	Wood Millet	29	
Oryzopsis asperifolia Michx.	Rough-leaved Mountain Rice	29	
Leersia oryzoides (L.) Sw.	Rice Cut Grass	29,10	
Echinochloa crusgalli (L.) Beauv.	Barnyard Grass	29	
CYPERACEAE	SEDGE FAMILY		
Scirpus atrovirens Willd.	Black Bulrush	29	
S. cyperinus (L.) Kunth.	Wool-grass	29,10	
Eleocharis obtusa (Willd.) Schult.	Blunt Spike-rush	10	
Carex albursina Sheldon.	Sedge	29	
C. arctata Boott.	Sedge	29	
C. convoluta Mack.	Sedge	29	
C. crinita Lam.	Sedge	10,29	
C. deweyana Schwein.	Sedge	29	
C. gracillima Schw.	Sedge	29	
C. intumescens Rudge	Sedge	10,29	
C. lacustris Willd.	Sedge	10,29	
C. lupulina Muhl. ex Willd.	Sedge	10,29	
C. lurida Wahl.	Sedge	29,10	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
C. *pensylvanica* Lam.	Sedge	29	
C. *platyphylla* Carey.	Sedge	29	
C. *projecta* Mack	Sedge	10	
C. *rosea* Schk.	Sedge	29	
C. *scoparia* Muhl. ex Willd.	Sedge	29	
C. *stipata* Muhl.	Sedge	29	
C. *tribuloides* Wahl.	Sedge	10,28, 29	
C. *vulpinoidea* Michx.	Sedge	29	
ARACEAE	ARUM FAMILY		
Arisaema triphyllum (L.) Torr.	Jack-in-the-pulpit	29	
LEMNACEAE	DUCKWEED FAMILY		
Lemna minor L.	Common Duckweed	28,29, 10	
JUNCACEAE	RUSH FAMILY		
Juncus dudleyi Wiegand.	Dudley's Rush	29	
J. *effusus* L.	Soft Rush	29	
J. *tennuis* Willd.	Path Rush	29	
J. *torreyi* Coville	Torrey's Rush	29	
Luzula acuminata Raf.	Hairy Wood Rush	29	
LILIACEAE	LILY FAMILY		
Uvularia sessilifolia L.	Sessile-leaved Bellwort	29,10 27	
Allium tricoccum Ait.	Wild Leek	27	
Lilium canadense var. *michiganense* Farw.	Michigan Lily	29,28,27	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
Erythronium americanum Ker.	Yellow Trout Lily	27	
Smilacena racemosa (L.) Desf.	False Solomon's-seal	29,27	
Maianthemum canadense Desf.	Wild Lily-of-the-valley	29,27, 10	
Polygonatum pubescens (Willd.) Pursh.	Solomon's-seal	29	
Trillium grandiflorum (Michx.) Salisb.	Large-flowered Trillium	27,28	
Smilax herbacea L.	Carrionflower	27	
S. tamnoides L. var. *hispida* (Muhl.) Fern.	Bristly Catbrier	29,27	
IRIDACEAE	IRIS FAMILY		
Iris versicolor L.	Wild Blue Flag	29	
ORCHIDACEAE	ORCHID FAMILY		
Epipactis helleborine (L.) Crantz.	Helleborine	29	
SALICACEAE	WILLOW FAMILY		
Populus grandidentata Michx.	Large-toothed Aspen	27	3,14,16
P. tremuloides Michx.	Trembling Aspen	29,10 27	3,14,15, 16
Salix alba L.	White Willow	29	
S. amygdaloides Anderss.	Peach-leaved Willow	12,27	
S. eriocephala Michx.	Willow	27,29	
S. fragilis L.	Crack Willow	10	
S. lucida Muhl.	Shining Willow	12,27	
S. nigra Marsh.	Black Willow	10	14
S. petiolaris J.E.	Slender Willow	12,29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
JUGLANDACEAE	WALNUT FAMILY		
Juglans nigra L.	Black Walnut		31
Carya cordiformis (Wang.) K. Koch.	Bitternut Hickory		16,3,14
C. laciniosa (Michx. f.) Loud *	Big Shellbark Hickory	13,34	
C. ovata (Mill.) K. Koch.	Shagbark Hickory	29,28 10,27	15,16,3, 14
C. tomentosa Nutt.	Mockernut Hickory		15,19
BETULACEAE	BIRCH FAMILY		
Carpinus caroliniana Walt.	Blue Beech	29,28, 10,27	3,15,16 14
Ostrya virginiana (Mill.) K. Koch	Hop Hornbeam	27,29	3,15,16, 14
Betula allegheniensis Britt.	Yellow Birch		15,16,3, 14
B. papyrifera Marsh.	Paper Birch		15,3,16
Alnus incana (L.) Moench ssp. *rugosa* (Du Roi) Clausen	Speckled Alder		14
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech	29,28, 27,11, 10	15,16,11, 17,3,14
Quercus alba L.	White Oak	29,28, 27,11, 10	16,15,18 17,11
Q. bicolor Willd.	Swamp White Oak	29,28, 27,10, 2	16,3,14 15,31
Q. palustris Muenchh. *	Pin Oak	29,28, 10,2,34, 12,27	
Q. rubra L.	Red Oak	29,28, 27,11, 10	16,15,17, 11,18,3, 14

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	29,10, 27	15,3,11 14,16
U. rubra Muhl.	Slippery Elm		3,14,16
URTICACEAE	NETTLE FAMILY		
Laportea canadensis (L.) Wedd.	Wood Nettle	27	
Pilea pumila (L.) Gray	Clearweed	27,29	
Boehmeria cylindrica (L.) Schwein.	False Nettle	27,29	
SANTALACEAE	SANDALWOOD FAMILY		
Comandra umbellata (L.) Nutt.	Bastard Toadflax	29	
ARISTOLOCHIACEAE	BIRTHWORT FAMILY		
Asarum canadense L.	Wild Ginger	27	
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex crispus L.	Curled Dock	29	
Polygonum coccineum Muhl.	Swamp Smartweed	10	
P. hydropiperoides Michx.	Mild Water Pepper	29	
P. pensylvanicum L.	Pennsylvania Smartweed	10,29	
Tovara virginiana (L.) Raf.	Virginia Knotweed	27	
Bilderdykia convolvulus (L.) Dumort.	Wild Buckwheat	29	
Fagopyrum esculentum Moench.	Buckwheat	29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium album L.	Lamb's-quarters	29	
Atriplex hastata L.	Halberd-leaved Orache	29	
PHYTOLACCACEAE	POKEWEED FAMILY		
Phytolacca americana L.	Pokeweed	10	
CARYOPHYLLACEAE	PINK FAMILY		
Stellaria graminea L.	Grass-leaved Stitchwort	29	
Arenaria lateriflora L. *	Blunt-leaved Sandwort	2,28	
A. serpyllifolia L.	Thyme-leaved Sandwort	29	
Dianthus armeria L.	Deptford Pink	29	
RANUNCULACEAE	BUTTERCUP FAMILY		
Coptis groenlandicus (Oeder.) Fern.	Goldthread	29	
Aquilegia canadensis L.	Wild Columbine	27	
Hepatica americana (DC.) Ker.	Blunt-leaved Hepatica	29	
Clematis virginiana L.	Virgin's Bower	29	
Ranunculus abortivus L.	Kidney-leaved Buttercup	29	
R. acris L.	Tall Buttercup	29	
R. pensylvanicus L.f.	Bristly Crowfoot	29	
R. scleratus L.	Celery-leaved Buttercup	10	
Thalictrum dioicum L.	Early Meadow Rue	27	
T. polygamum Muhl.	Tall Meadow Rue	29	
BERBERIDACEAE	BARBERRY FAMILY		
Podophyllum peltatum L.	May-apple	27	
Berberis thunbergii DC.	Japanese Barberry	29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LAURACEAE	LAUREL FAMILY		
Sassafras albidum (Nutt.) Nees	Sassafras		14,16
PAPAVERACEAE	POPPY FAMILY		
Sanguineria canadensis L.	Bloodroot	27	
CRASSULACEAE	SEDUM FAMILY		
Penthorum sedoides L.	Ditch-stonecrop	*10*,29	
GROSSULARIACEAE	GOOSEBERRY FAMILY		
Ribes americanum Mill.	American Black Currant	29,27	
R. cynosbati L.	Pasture Gooseberry	29,27	
HAMAMELIDACEAE	WITCH-HAZEL FAMILY		
Hamamelis virginiana L.	Witch-hazel	29,27	16
ROSACEAE	ROSE FAMILY		
Spirea alba Du Roi	Narrow-leaved Meadowsweet	29,*10*, 27	
Pyrus communis L.	Pear	27	
M. domestica Borkh.	Apple	27	
Amelanchier arborea (Michx. fil.) Fern.	Serviceberry	29,27	
A. humilis Wieg.	Serviceberry	27	
A. laevis Wieg.	Smooth Serviceberry	*10*	
Aronia melanocarpa (Michx.) Ell.	Chokeberry	27	
Crataegus calpodendron (Ehrh.) Medik.	Hawthorn	29	
Rubus allegheniensis Porter	Common Blackberry	29,*10* 27	
R. flagellaris Willd.	Northern Dewberry	27	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
R. hispidus L.	Dewberry	10,27,29	
R. idaeus L. var. *strigosus* (Michx.) Maxim.	Wild Red Raspberry	27,29	
R. occidentalis L.	Black Raspberry	29	
R. pubescens Raf.	Dwarf Raspberry	27,29	
Fragaria vesca L.	Wood Strawberry	29	
F. virginiana Dene.	Strawberry	29	
Potentilla norvegica L.	Rough Cinquefoil	29	
P. recta L.	Sulphur Cinquefoil	29	
P. simplex Michx.	Common Cinquefoil	29	
Geum allepicum Jacq. var. *strictum* (Ait.) Fern.	Yellow Avens	29	
G. canadense Jacq.	Avens	29	
G. laciniatum Murr.	Avens	28,29	
Agrimonia gryposepala Wallr.	Agrimony	29	
Rosa blanda Ait.	Smooth Rose	29	
R. carolinia L.	Pasture Rose	27,29	
R. eglanteria L.	Sweetbriar	29	
R. palustris Marsh.	Swamp Rose	27,10,29	
Prunus avium L.	Sweet Cherry	27	
P. pensylvanica L. fil.	Pincherry		14,16
P. serotina Ehrh.	Black Cherry	27,29	16,15,14
P. virginiana L.	Choke Cherry	27,29	15
FABACEAE	PEA FAMILY		
Medicago sativa L.	Alfalfa	29	
Melilotus alba Desr.	White Sweet-clover	29	
M. officinalis (L.) Lam.	Yellow Sweet-clover	29	
Trifolium hybridum L.	Alsike Clover	29	
T. pratense L.	Red Clover	29	
T. repens L.	White Clover	29	
Lotus corniculatus L.	Bird's- foot Trefoil	29	
Vicia cracca L.	Cow Vetch	29	
Amphicarpa bracteata (L.) Fern.	Hog-peanut	29	
Apios americana Medic.	Groundnut	27	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	OCCURRENCE AND SOURCES VICINITY
GERANIACEAE	GERANIUM FAMILY		
Geranium maculatum L.	Wild Geranium	27,29	
OXYLIDACEAE	WOOD-SORREL FAMILY		
Oxalis stricta L.	European Wood Sorrel	29	
EUPHORBIACEAE	SPURGE FAMILY		
Acalypha paucifolia Willd.	Three-seeded Mercury	29	
ANACARDIACEAE	CASHEW FAMILY		
Rhus radicans L.	Poison Ivy	29,10 27	
R. typhina L.	Staghorn Sumac	27	
AQUIFOLIACEAE	HOLLY FAMILY		
Ilex verticillata (L.) Gray	Winterberry	29,28, 10,27	
CELASTRACEAE	STAFF-TREE FAMILY		
Euonymus obovatus Nutt.	Running Strawberry Bush	29,27, 28	
Celastrus scandens L.	Bittersweet	27	
ACERACEAE	MAPLE FAMILY		
Acer negundo L.	Manitoba Maple	27	
A. nigrum Michx. f.	Black Maple		14,15
A. rubrum L.	Red Maple	29,28, 27,10, 11	14,18,16, 15,11,3
A. saccharinum L.	Silver Maple	29,28 27	16,3,11
A. saccharum Marsh.	Sugar Maple	29,28, 10,27	18,11,15, 3,14

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BALSAMINACEAE	JEWEL-WEED FAMILY		
Impatiens biflora Walt.	Spotted Jewelweed	29,10, 27	
VITACEAE	GRAPE FAMILY		
Vitis riparia Michx.	Wild Grape	29,10 27	
Parthenocissus quinquefolia (L.) Planch.	Virginia Creeper	29	
P. vitacea (Knerr.) Hitchc.	Virginia Creeper	27,10, 29	
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	11,10 29,27	14,3,17, 15,16,11
HYPERICACEAE	ST. JOHN'S-WORT FAMILY		
Hypericum perforatum L.	Common St. John's-wort	29	
Triadenum fraseri (Spach.) Gl.	Marsh St. John's-wort	28,29	
VIOLACEAE	VIOLET FAMILY		
Viola cucullata Ait.	Stemless Blue Violet	29	
V. pubescens Ait. var. *pubescens*	Downy Yellow Violet	29	
NYSSACEAE	SOUR GUM FAMILY		
Nyssa sylvatica Marsh *	Tupelo	29,28 27,12 2	4,20 31

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES	
		SITE	VICINITY
ONAGRACEAE	EVENING-PRIMROSE FAMILY		
Epilobium ciliatum Raf.	Northern Willow-herb	29	
Oenothera parviflora L.	Small-flowered Evening-primrose	29	
Circaea quadrisulcata (Maxim.) Franch. & Sav.	Enchanter's Nightshade	29	
ARALIACEAE	GINSENG FAMILY		
Aralia nudicaulis L.	Wild Sarsparilla	29,10, 27	
A. racemosa L.	Spikenard	27	
ADIACEAE	CARROT FAMILY		
Sanicula marlandica L.	Black Snakeroot	29	
Osmorhiza claytoni (Michx.) Clarke	Sweet Cicely	29	
Cicuta bulbifera L.	Bulbous Water-hemlock	29	
C. maculata L.	Spotted Water-hemlock	10,29	
Daucus carota L.	Wild Carrot	29	
CORNACEAE	DOGWOOD FAMILY		
Cornus florida L.	Flowering Dogwood		14,16
C. obliqua Raf.	Silky Dogwood	29	
C. racemosa Lam.	Gray Dogwood	29,10 27	
C. stolonifera Michx.	Red Osier	29	
PYROLACEAE	WINTERGREEN FAMILY		
Monotropa uniflora (L.) Gray	Indian-pipe	29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ERICACEAE	HEATH FAMILY		
Gaultheria procumbens L.	Wintergreen	27,29	
Vaccinium corymbosum L.	Highbush Blueberry	29,28, 10,27	
V. pallidum Ait.	Low Sweet Blueberry	29,28	
PRIMULACEAE	PRIMROSE FAMILY		
Lysimachia ciliata L.	Fringed Loosestrife	29	
L. thyrsiflora L.	Tufted Loosestrife	29	
Trientalis borealis Raf.	Star-flower	29	
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash	29,28, 11,27	14,16,17 3,15
F. nigra Marsh.	Black Ash	27,12, 10	3,16
F. pennsylvanica Marsh.	Red Ash	29,27	3,16
F. pennsylvanica var. *subintegerrima* (Vahl) Fern.	Green Ash	27	
APOCYNACEAE	DOGBANE FAMILY		
Apocynum androsaemifolium L.	Spreading Dogbane	29	
ASCLEPIADACEAE	MILKWEED FAMILY		
Asclepias incarnata L.	Swamp Milkweed	29	
A. syriaca L.	Common Milkweed	29,10	
HYDROPHYLLACEAE	WATERLEAF FAMILY		
Hydrophyllum virginianum L.	Virginia Waterleaf	27	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
VERBENIACEAE	VERVAIN FAMILY		
Verbena hastata L.	Blue Vervain	29	
LAMIACEAE	MINT FAMILY		
Scutellaria lateriflora L.	Mad-dog Skullcap	29	
Prunella vulgaris L.	Heal-all	10,29	
Hedeoma pulegioides L.	American Pennyroyal	29	
Lycopus americanus Muhl.	American Water-horehound	10	
L. uniflorus Michx.	Water-horehound	29	
L. virginicus L.	Water-horehound	28	
Collinsonia canadensis L.	Horse-balm	27	
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum dulcamara L.	Climbing Nightshade	29,28, 10,27	
SCROPHULARIACEAE	FIGWORT FAMILY		
Verbascum thapsus L.	Common Mullein	10,29	
Chelone glabra L.	Turtlehead	27	
Veronica officinalis L.	Common Speedwell	29	
V. scutellata L.	Marsh Speedwell	10	
Pedicularis canadensis L.	Lousewort	29	
ORBANCHACEAE	BROOM-RAPE FAMILY		
Epifagus virginiana (L.) Bart.	Beech-drops	29	
PLANTAGINACEAE	PLANTAIN FAMILY		
Plantago lanceolata L.	Narrow-leaved Plantain	29	
P. rugelii Dcne.	Rugel's Plantain	29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
RUBIACEAE	MADDER FAMILY		
Cephalanthus occidentalis L.	Buttonbush	29,28 27,10	26
Mitchella repens L.	Partridge-berry	29,27	
Galium obtusum Bigel.	Bedstraw	29	
G. triflorum Michx.	Sweet-scented Bedstraw	29	
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Sambucus canadensis L.	Common Elder	29,10,27	
Viburnum acerifolium	Maple-leaved Viburnum	10,29	14
V. recognitum Fern. *	Southern Arrow-wood	29,28,27,12,10,34	
Triosteum aurantiacum Bicknell	Horse-gentian	27	
Lonicera canadensis Bartr.	Fly Honeysuckle	10	
L. dioica L.	Glaucous Honeysuckle	29,27	
Diervilla lonicera Mill.	Bush Honeysuckle	29,27	
DIPSACACEAE	TEASEL FAMILY		
Dipsacus fullonum L.	Teasel	29	
CUCURBITACEAE	GOURD FAMILY		
Echinocystis lobata (Michx.) T. & G.	Wild Cucumber	27	
CAMPANULACEAE	HAREBELL FAMILY		
Lobelia inflata L.	Indian Tobacco	29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ASTERACEAE	ASTER FAMILY		
Eupatorium perfoliatum L.	Boneset	10,29	
Solidago bicolor L.	White Goldenrod	29	
S. caesia L.	Blue-stemmed Goldenrod	29	
S. canadensis L.	Canada Goldenrod	10,27 29	
S. flexicaulis L.	Zig-zag Goldenrod	29	
S. hispida Muhl.	Hairy Goldenrod	10	
S. juncea Ait.	Early Goldenrod	27	
S. rugosa Ait.	Rough Goldenrod	29	
Euthamia graminifolia (L.) Nutt.	Fragrant Goldenrod	29	
Aster ericoides L.	White Heath Aster	29	
A. lateriflorus (L.) Britt.	One-sided Aster	29	
A. macrophyllus L.	Large-leaved Aster	27,29	
A. novae-angliae L.	New England Aster	10,29	
A. pilosus Willd. *	Spray Aster	28,29	
A. simplex Willd.	Panicled Aster	29	
A. umbellatus Mill.	Flat-topped White Aster	10,29	
Erigeron annuus (L.) Pers. (ssp. *annuus* and *strigosus*)	Annual Fleabane	29	
Antennaria neglecta Greene	Pussytoes	29	
Ambrosia artemisiifolia L.	Common Ragweed	10,29	
Bidens cernua L.	Nodding Beggar-ticks	10,29	
B. connata Muhl.	Devil's Beggar-ticks	10	
B. frondosa L.	Beggar-ticks	29	
Achillea millefolium L.	Yarrow	29	
Tussilago farfara L.	Coltsfoot	29	
Senecio vulgaris L.	Common Groundsel	29	
Cirsium arvense (L.) Scop.	Canada Thistle	10	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
C. vulgare (Savi.) Tenore	Bull Thistle	29	
Cichorium intybus L.	Chickory	10,29	
Taraxacum officinale Weber	Dandelion	29	
Lactuca biennis (Moench) Fern.	Tall Blue Lettuce	29	
L. scariola L.	Prickly Lettuce	29	
Prenanthes alba L.	White Lettuce	29	
P. altissima L.	White Lettuce	29	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BRYOPHYTES			
SPHAGNACEAE			
Sphagnum squarrosum Crome		28,10	
CLIMACIACEAE			
Climacium dendroides (Hedw.) Web. & Mohr.		10	
LESKEACEAE			
Leskea polycarpa Hedw.		10	

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE LF-9C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Common Loon	*Gavia immer*	9	
Great Blue Heron	*Ardea herodias*	9,10	4,6,8,21, 24
Green-backed Heron	*Butorides striatus*		8
Canada Goose	*Branta canadensis*		4,24
Mallard	*Anas platyrhynchos*		1,8
Blue-winged Teal	*Anas discors*		1,8
Northern Harrier	*Circus cyaneus*	30	
Turkey Vulture	*Cathartes aura*	2,27	2,8
Red-tailed Hawk	*Buteo jamaicensis*	27,30 31	8
American Kestrel	*Falco sparverius*	2,27 30	2,8,26
Ring-necked Pheasant	*Phasianus colchicus*		3
Ruffed Grouse	*Bonasa umbellus*	1	1,3,8 32
Virginia Rail	*Rallus limicola*		8
Sora	*Porzana carolina*		8
Killdeer	*Charadrius vociferus*	27	8
Spotted Sandpiper	*Actitis macularia*		8
Upland Sandpiper	*Bartramia longicauda*		8
Common Snipe	*Gallinago gallinago*		8
American Woodcock	*Scolopax minor*	2,12	8
Ring-billed Gull	*Larus delawarensis*	27	
Rock Dove	*Columba livia*	10	8
Mourning Dove	*Zenaida macroura*	10,27 30	8
Black-billed Cuckoo	*Coccyzus erythrophthalmus*		8
Eastern Screech-Owl	*Otus asio*		8,33
Great Horned Owl	*Bubo virginianus*		8,33
Chimney Swift	*Chaetura pelagica*	27	
Ruby-throated Hummingbird	*Archilochus colubris*		8,21,23
Belted Kingfisher	*Ceryle alcyon*	27	
Red-headed Woodpecker	*Melanerpes erythrocephalus*	12,27	3
Downy Woodpecker	*Picoides pubescens*	27	8
Hairy Woodpecker	*Picoides villosus*	27	
Northern Flicker	*Colaptes auratus*	10	8
Eastern Wood-Pewee	*Contopus virens*		8
Alder Flycatcher	*Empidonax alnorum*		8
Willow Flycatcher	*Empidonax traillii*		8
Least Flycatcher	*Empidonax minimus*		8
Great Crested Flycatcher	*Myiarchus crinitus*		8
Eastern Kingbird	*Tyrannus tyrannus*		8
Horned Lark	*Eremophila alpestris*		8

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Purple Martin	*Progne subis*	27	8
Tree Swallow	*Tachycineta bicolor*		8
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		8
Barn Swallow	*Hirundo rustica*	27	8
Blue Jay	*Cyanocitta cristata*	10,27	8
American Crow	*Corvus brachyrhynchos*	10,27	8
Black-capped Chickadee	*Parus atricapillus*	10,27	8
White-breasted Nuthatch	*Sitta carolinensis*	10	8
Brown Creeper	*Certhia americana*		8
House Wren	*Troglodytes aedon*	27	8
Blue-gray Gnatcatcher	*Polioptila caerulea*		8
Eastern Bluebird	*Sialia sialis**	27	
Veery	*Catharus fuscescens*		8
Wood Thrush	*Hylocichla mustelina*		8
American Robin	*Turdus migratorius*	27	3,8
Gray Catbird	*Dumetella carolinensis*	10,27	8
Northern Mockingbird	*Mimus polyglottos*	12,27	12
Brown Thrasher	*Toxostoma rufum*	27	8
Cedar Waxwing	*Bombycilla cedrorum*	27	8
European Starling	*Sturnus vulgaris*	10,27	8
Warbling Vireo	*Vireo gilvus*	27	8
Red-eyed Vireo	*Vireo olivaceus*		8
Yellow Warbler	*Dendroica petechia*	27	8
Black-throated Green Warbler	*Dendroica virens*		8
Ovenbird	*Seiurus aurocapillus*		8
Common Yellowthroat	*Geothlypis trichas*	10,27	8
Northern Cardinal	*Cardinalis cardinalis*		8
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		8
Indigo Bunting	*Passerina cyanea*	27	8
Rufous-sided Towhee	*Pipilo erythrophthalmus*		8
American Tree Sparrow	*Spizella arborea*	30	
Chipping Sparrow	*Spizella passerina*		8
Field Sparrow	*Spizella pusilla*		8
Vesper Sparrow	*Pooecetes gramineus*		8
Savannah Sparrow	*Passerculus sandwichensis*	27	8
Song Sparrow	*Melospiza melodia*	27,30	8

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Swamp Sparrow	*Melospiza georgiana*	10	8
Bobolink	*Dolichonyx oryzivorus*		8
Red-winged Blackbird	*Agelaius phoeniceus*	27	3,8
Eastern Meadowlark	*Sturnella magna*	27	8
Common Grackle	*Quiscalus quiscula*	27	8
Brown-headed Cowbird	*Molothrus ater*	10,27	8
Orchard Oriole	*Icterus spurius* *	12	12
Northern Oriole	*Icterus galbula*	27	8
House Finch	*Carpodacus mexicanus*	27	
American Goldfinch	*Carduelis tristis*	10,27	21,23
House Sparrow	*Passer domesticus*	27,30	8

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE LF-9C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Opossum	*Didelphis virginiana* *	2,12, 27	2,6
Eastern Cottontail	*Sylvilagus floridanus*	1	1,7,32
European Hare	*Lepus europaeus*		32
Eastern Chipmunk	*Tamias striatus*		32
Grey Squirrel	*Sciurus carolinensis*	27	1,7
White-footed Mouse	*Peromyscus leucopus*	27	
Muskrat	*Ondatra zibethicus*	1,2	2,4,7,25
Meadow Vole	*Microtus pennsylvanicus*	27	
Norway Rat	*Rattus norvegicus*		32
Meadow Jumping Mouse	*Zapus hudsonius*	27	
Coyote	*Canis latrans*	27	
Red Fox	*Vulpes vulpes*	1,2	2,22,23
Raccoon	*Procyon lotor*	1	3,4,7, 24
American Mink	*Mustela vison*	1	4
Striped Skunk	*Mephitis mephitis*	27	
Lynx	*Lynx lynx* *		2
Bobcat	*Lynx rufus* *	12	
White-tailed Deer	*Odocoileus virginianus*	1	1,2,3,4, 5,6,10, 21,22,23, 24,25

* Denotes that the species is considered to be rare based upon recognized literature sources (See Sections 4.4 and 5.5).

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE LF-9C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Eastern American Toad	*Bufo a. americanus*	27	
Northern Spring Peeper	*Hyla c. crucifer*	27	
Gray Treefrog	*Hyla versicolor*	26,27	
Western Chorus Frog	*Pseudacris t. triseriata*	27	
Bullfrog	*Rana catesbeiana*		32
Northern Leopard Frog	*Rana pipiens*	10,27	
Wood Frog	*Rana sylvatica*	27	
Common Snapping Turtle	*Chelydra s. serpentina*		32
Midland Painted Turtle	*Chrysemys picta marginata*		32
Black Rat Snake	*Elaphe o. obsoleta* *		12
Eastern Milk Snake	*Lampropeltis t. triangulum*		32
Eastern Garter Snake	*Thamnophis s. sirtalis*	27	

* Denotes that the species is considered to be rare based upon recognized literature sources (see Section 4.4 and 5.5).

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE LF-9C AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Northern Pike	*Esox lucius*	1	1,2,4,6

DATA SOURCES FOR TABLES 5-9

1. McPherson, 1984.
2. West Lincoln Task Force Against Toxic Waste, 1984.
3. Brady *et al*., 1980.
4. Beamer, C., 1984a.
5. Beamer, K., 1984.
6. Diek, 1984.
7. Hill, 1984.
8. Ontario Breeding Bird Atlas, 1984.
9. Maylott, 1984.
10. Gartner Lee Associates Limited, 1984a.
11. Ontario Ministry of Natural Resources, 1979.
12. Meyers, 1984a.
13. Meyers, 1984b.
14. Brady *et al*., 1979a.
15. Brady *et al*., 1979b.
16. Brady *et al*., 1979c.
17. Ontario Ministry of Natural Resources, 1984.
18. Ontario Ministry of Natural Resources, 1984.
19. Macdonald, 1980.
20. Beamer,C., 1984b.

DATA SOURCES FOR TABLES 5-9 (cont'd)

21. Maylott and Maylott, 1984.
22. Flamlink, 1984.
23. Schuender, 1984.
24. Melon, 1984.
25. Kszan, 1984.
26. Gartner Lee Associates Limited. 1984b.
27. Meyers, 1984c.
28. Webber, 1984a.
29. Webber, 1984b.
30. Gartner Lee Associates Limited, 1984d.
31. Gartner Lee Associates Limited, 1984e.
32. West Lincoln Task Force Against Toxic Wastes, 1985.
33. Dinga, 1985.
34. Meyers, 1985b.

Note: For complete citations see Section 6 - Information Sources.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site LF-9C from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 10. Interview numbers are related to identifications assigned by Ecologistics Ltd. during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview form are contained in Table 11. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

During conversations with landowners regarding permission to conduct field work on these properties, we followed up on questions which arose from a review of "Walk-and-Talk" interview data. Table 12 is an example of a completed "Public Contact - Local Data Collection" form which records such a follow up conversation.

Completed "Public Contact - Local Data Collection" forms are on file at Gartner Lee Associates Limited. Table 13 is a summary of information arising from these follow-up contacts.

TABLE 10: SUMMARY OF INTERVIEW (WALK-AND-TALK) DATA - SITE LF-9C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Clarence Beamer	10-102, 10-100, 10-155, 10-155-1	LF-9C (SV)	87-2	- pike in stream ,Canada Geese in pond, deer, muskrat, raccoon, mink, blue heron - trapping and hunting on properties; fuelwood taken from bush
Mr. & Mrs. K. Beamer	10-101	LF-9C (SV)	119-2	- deer, hawk - cut firewood, harvest maple syrup, hunt deer
Mr. Hans Diek	10-76	LF-9C (SV)	88-2	- blue herons, deer, opossums - fishing in Sucker Creek - fuelwood taken from neighbour's bush
Mr. & Mrs. Ross Allen	7-271, 10-160, 10-161, 6-114	LF-9C (SV)	548	- harvest wild pears, apples, hickory nuts, strawberries - fuelwood from woodlot
Messrs. Morningstar	10-106	LF-9C (S)	38-2	- none

TABLE 10: CONTINUED

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Wm. DeVries	10-108	LF-9C (SV)	478-G	- none
Mr. George Miller	10-239	LF-9C (SV)	556	- none
Mr. & Mrs. C. Huizinga	10-162	LF-9C (SV)	220-2	- none
Mr. Chris Tsiantoulas	10-160	LF-9C (SV)	118-2	- rabbit hunting
Mr. J. Melon	10-105	LF-9C (S)	97-2	- hawk nesting, heron, wild geese, raccoon, deer - hunt deer, harvest mushrooms, fuelwood
Mr. & Mrs. S. Kszan	10-80 10-111, 10-16, 10-82	LF-9C (S) LF-9C (SV)	96-2	- deer, hawks, hickory trees, wild ducks - trap muskrats, take fuelwood, harvest maple syrup in neighbours woodlot

TABLE 10: CONTINUED

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Peter Schuender	7-16, 7-15, 7-20	LF-9C (SV)	8-2	- hummingbirds, goldfinches, foxes, deer run between woodlots on 7-264 and 7-22
Mr. Y. Flamlink	10-81 7-268	LF-9C (S) LF-9C (SV)	not provided	- fox, deer - fuelwood from bush, harvest wild strawberries and mushrooms
Ms. Norma Jean Vitucci	7-240-5	LF-9C (SV)	468-G	- none
Mr. John Murdock	10-241	LF-9C (SV)	557	- none
Mr. & Mrs. Q.B. Chou	10-161	LF-9C (SV)	223-2	- none
Mr. & Mrs. P. Maylott	10-77	LF-9C (SV)	110-A	- yellow finch, hummingbirds may nest on site, deer, cranes nest at pond down the road - have home garden, harvest wild strawberries

Interview Identification Number: ________

TABLE 11: BIOLOGY QUESTIONS LISTED ON WALK-AND-TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

TABLE 12: EXAMPLE OF A COMPLETED "PUBLIC CONTACT - LOCAL DATA COLLECTION" FORM

PUBLIC CONTACT - LOCAL DATA COLLECTION

No. 6

CANDIDATE SITE LF-9C

PROPERTY ROLL NUMBER(S)

LANDOWNER:

NAME Mr. Clarence Beamer

ADDRESS

TELEPHONE NUMBER 0-386-6486

LANDOWNER CONTACTED BY:

TELEPHONE ✓

MAIL

VISIT

DATE OF CONTACT: Sept 10/84
705 pm

ISSUE(S) TO DISCUSS:

- Black Gum Tree: CB indicated he knows of 1 Nyssa sylvatica tree (that was large 50 yrs ago when his father showed it to him) in his son's woodlot or acreage in the northeast corner of site LF-9C. - he thought it would be "about 16" through"
- In the same woodlot is a black ash tree - a plus tree according to MNR - it is on his son's land.

REMARKS:

- CB [illegible] a plus tree - [illegible]
[illegible] collect seed from it

he suggested calling [illegible] Kenneth 386-6760
: the tree has a number [illegible]
Fonthill could tell us what it means

• Pike - he sees some pike in Sucker Creek [illegible]
(about 12-15" long) - he used to shoot them
with a shotgun: now some people spear them
- he thinks the pike travel upstream about [illegible]
mile past his property

SKETCH MAP:

TABLE 13: SUMMARY OF FOLLOW-UP INTERVIEW DATA FOR SITE LF-9C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	BIOLOGY COMMENTS
Mr. Hans Diek	10-76	LF-9C (SV)	- discussed "possums" :he could not pinpoint den sites however he said the species is numerous - discussed fishing: he could not identify species taken - he indicated that several spearfish Sucker Creek each Spring
Mrs. Maylott	10-77	LF-9C	- discussed "Cranes" - Mrs. Maylott identified them as Great Blue Herons and noted she has seen them on the site - she also indicated that she has heard "loons and ducks" in the area.
Mr. Clarence Beamer	10-102, 10-100, 10-155, 10-155-1	LF-9C (SV)	- Mr. Beamer reported a Tupelo tree on property 10-101 (LF-9C) with an approximate dbh of 16 inches.

TABLE 13: SUMMARY OF FOLLOW-UP INTERVIEW DATA FOR SITE LF-9C

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	BIOLOGY COMMENTS
Mr. Clarence Beamer (continued)			- a White Pine "Plus Tree" is located in the same woodlot - has never seen anyone collect seeds from it - he sees Pike in Sucker Creek every Spring (12-15 inches long). - some people spear the pike - the pike travel upstream about another mile past his property in the Spring

9.0 BIOLOGY
SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale. Completed data forms and station location maps are in working files at GLAL.

Table 14 is an example of a completed field data form. It is for station 13 on Site LF-9C.

TABLE 14: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - LF-9C

FIELD INVESTIGATIONS

STATION 13 ROLL / PHOTO(S) /

VEGETATION

VEGETATION ASSOCIATION M FRI DOMINANTS Mr3 Ov2 Av2 Or1 Be1 Bd1

Strata	% Cover	Plot Size	Dominant Species - Sample Collected: (c)
Tree Species >6m	/	/	
Tree Species <6m	/	/	
Shrub Species >1.5 m	10	5	Cephalanthus occidentalis Cornus racemosa
Shrub Species <1.5 m	5	5	Spirea alba
Graminoid/Herb Species	75	2	Bidens connata Carex sp (c)
Moss/Lichen Species	/	/	

Snags/Hectare ______

Average Canopy Height: FRI 19m, Field 5m Surface Wetness 2 Vegetation Mapping Change ______

Comments / Rare Or Uncommon Species:

WILDLIFE

Leopard frog - 1 (o)

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type P Average Width ______ Average Depth ______ Permanence ______ Turbidity ______

Approximate Area 500m²

Shoreline Conditions V organic Bottom Conditions organic

Fish And Invertebrate Species Observed:

Submergent, Emergent Plant Species:

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

some thicket area on fringes of marsh vegetation

Quercus bicolor : 2/ [illegible] specimens on edges of swamp

open water in centre of pond

Verifications

LF-9C-14 14) ~~Cinna arundinacea~~ Aster umbellatus L. CPH 2/10/84

LF-9C-15 15) Carex ~~cf. lupulina~~ lacustris Willd.

Page 14 of 24

10.0 OWMC PHASE 4A - BIOLOGY FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2

SEPTEMBER, 1984

Gartner Lee Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ■ Markham,Ontario ■ L3P 3J9 ■ 416-477-8400
Telex-06-986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m². The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m² gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m². Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.0 APPENDICES

3.1 SITE ACCESS PERMISSION FORM

No.________

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ____

____

LANDOWNER:

NAME ____

ADDRESS ____

TELEPHONE NUMBER ______________________________________

LANDOWNER CONTACTED BY:

TELEPHONE ______________ DATE OF CONTACT:

MAIL ______________ ____________________________

VISIT ______________

PERMISSION TO ENTER PROPERTY:

GRANTED ______________

NOT GRANTED ______________ REASON ______________________

PERMISSION TO COLLECT PLANT SAMPLES:

GRANTED ______________

NOT GRANTED ______________ REASON ______________________

COMMENTS: ____

____

____

____

____

Gartner
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Associates
Limited

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Lee
Associates
Limited

3.2

FIELD OBSERVATION SHEET | BIOLOGICAL STATIONS : | SITE

OWMC 84-S18.2

Gartner Lee Associates Limited

Candidate Site: ____________

A) Background

Air Photos: ____________

Photographs Taken:

Roll: ______ Photos: ____________

Corresponding Maps:

____

____

Observer(s): ____________

Date Of Visit: ____________

Time & Duration ____________

Weather:

Present: ____________

Previous Day: ____________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ____________

____

____

Flora: ____________

____

____

Fauna: ____________

____

____

Comments: ____________

____

____

____

____

____

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

- Vegetation Association

Forest:	deciduous	D	Upland = u Lowland = l
	coniferous	C	
	mixed	M	
Thicket:	shrub	T	
Field:	crop land	C	
	recently abandoned	FR	
	old	FO	
	successional	FS	
Others:	marsh	M	
	industrial/residential/ manicured	R	

Descriptors:

flooded	(F)
cutover and/or recent secondary succession	(C)
post-fire succession	(P)
grazed	(G)
drained	(D)
plantation	(Pl)

- Surface Wetness

dry	0
moist	1
wet	2

Wildlife

- Observation Code

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

- Type

stream	s
pond	p
diffuse ponding and swales	dp

- Permanence

possibly permanent	p
probably intermittent	pi
intermittent	i

- Turbidity

clear	c
cloudy	cl
turbid	t

- Shoreline Conditions

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

- Bottom Conditions

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

Page ___ of ___

SITE

SITE ____

FIELD INVESTIGATIONS

STATION ____ ROLL ____ PHOTO(S) ____

VEGETATION

VEGETATION ASSOCIATION ____ FRI DOMINANTS ____

Strata	% Cover	Plot Size	Dominant Species - Sample Collected: (c)
Tree Species>6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species <1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ____

Average Canopy Height: FRI ____, Field ____ Surface Wetness ____ Vegetation Mapping Change ____

Comments/Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____

Approximate Area ____

Shoreline Conditions ____ Bottom Conditions ____

Fish And Invertebrate Species Observed: ____

Submergent, Emergent Plant Species: ____

Comments/Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

Page ____ of ____

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No. ______

CANDIDATE SITE ______________________

PROPERTY ROLL NUMBER(S) ______________________

____

LANDOWNER:

NAME ______________________

ADDRESS ______________________

TELEPHONE NUMBER ______________________

LANDOWNER CONTACTED BY:

TELEPHONE ________

MAIL ________

VISIT ________

DATE OF CONTACT: ______________________

ISSUE(S) TO DISCUSS:

____

____

____

____

____

____

____

REMARKS:

SKETCH MAP:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees.

CONIFEROUS: forest is composed of 80% or more coniferous trees.

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include Crataegus sp., Cornus racemosa and Spirea alba.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).
Others:
WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including *Typha angustifolia* and *Scirpus atrovirens*. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

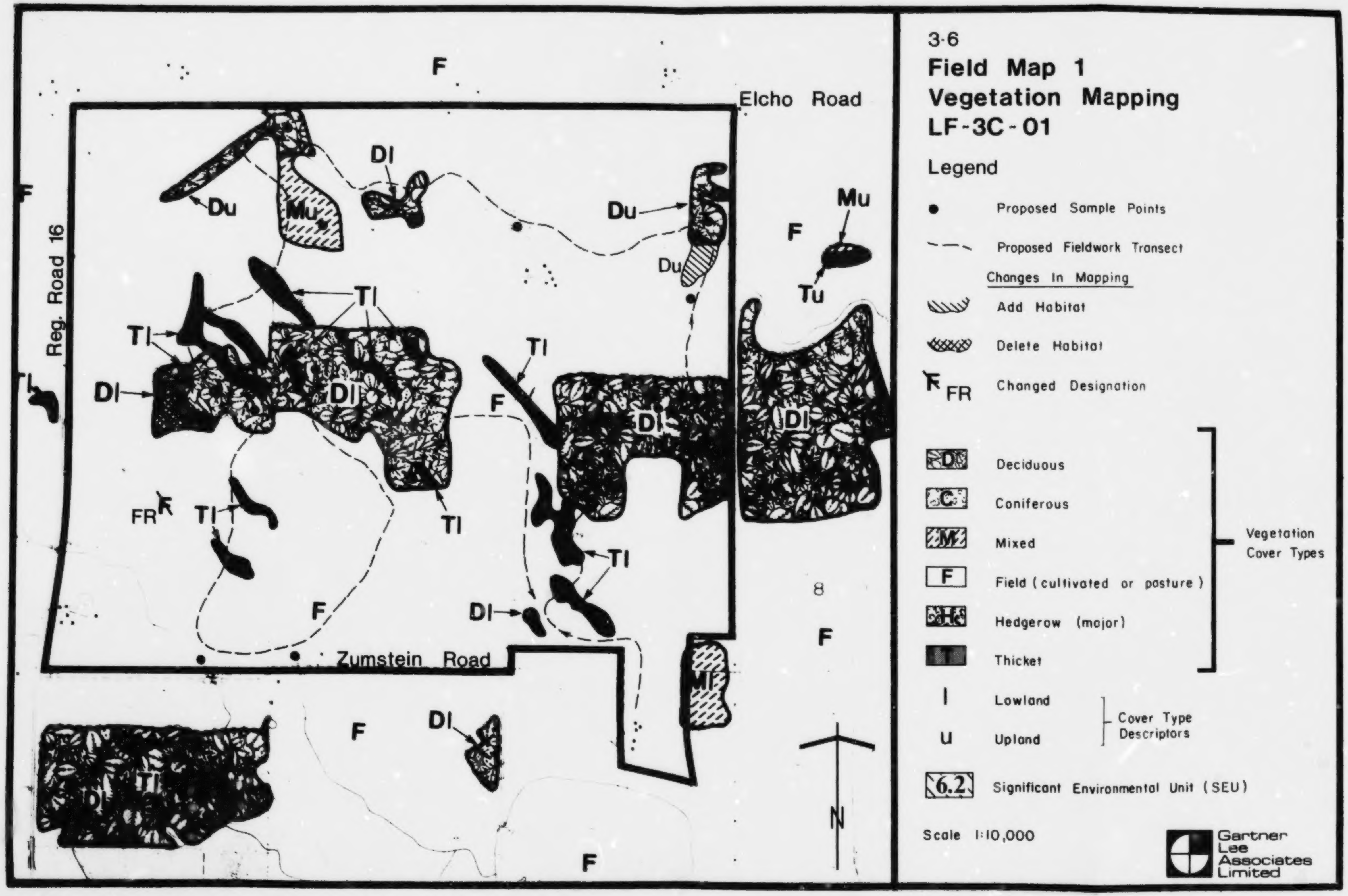
PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

Herbarium / Reseacher / Date

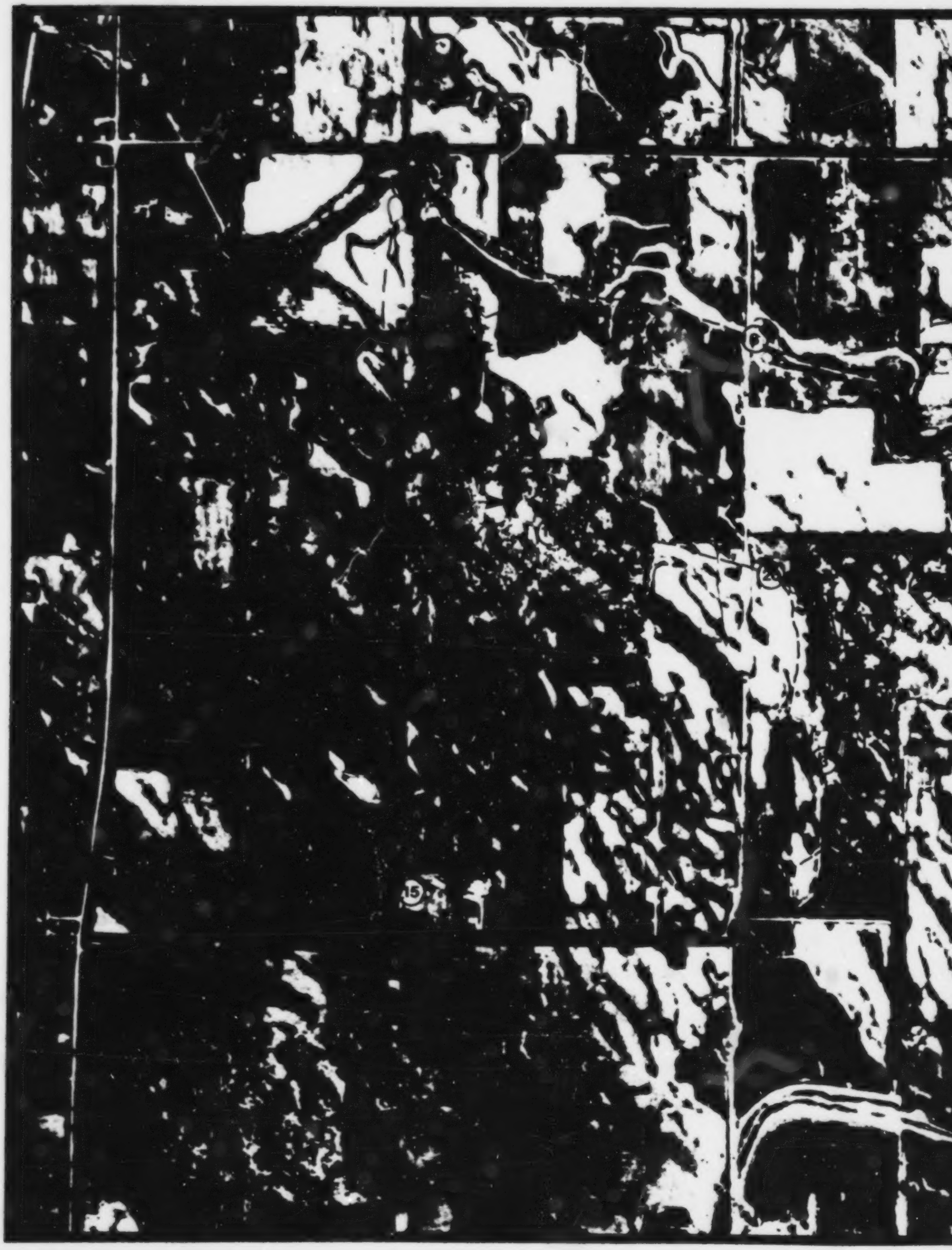
County	Township	Lot—Con.	Location	Date	Collector	No.	Habitat and Notes



3·6

Field Map 1
Vegetation Mapping
LF-3C-01

Legend
● Proposed Sample Points
– – Proposed Fieldwork Transect
Changes In Mapping
Add Habitat
Delete Habitat
FR Changed Designation
D Deciduous
C Coniferous
M Mixed
F Field (cultivated or posture)
He Hedgerow (major)
T Thicket
Vegetation Cover Types
l Lowland
u Upland
Cover Type Descriptors
6.2 Significant Environmental Unit (SEU)
Scale 1:10,000
Gartner Lee Associates Limited
Elcho Road
Reg. Road 16
Zumstein Road
F
Du
Mu
Dl
Tl
FR
Tu
Ml
8
N


15

3·7

Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥ Field Observation Station (example)

P6 → Photograph And Direction Taken

- - - Transect Followed In Field

MAP NOTES

Scale 1:10,000

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Number/
Numéro

3

SITE SELECTION PROCESS PHASE 4A:
TECHNICAL APPENDIX LF-1E -
EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee
Associates Limited

Gartner Lee Associates Limited

Consulting Engineering
Geologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex-06-986278

September 10, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West,
11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix LF-1E - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site LF-1E.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly
GARTNER LEE ASSOCIATES LIMITED

Grant Anderson

E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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BIOLOGICAL RESOURCES
STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr. - Associate and Senior Biologist of GLAL - Report Review

Kenneth Dance, M.Sc. - Associate and Senior Biologist of GLAL - Report Writing and Project Management

Thomas Hilditch, B.Sc.,Agr. - Biologist of GLAL - Data Collection

Donald Fraser, M.Sc. - Biologist of GLAL - Site Report Preparation

Wayne Weller, M.Sc. - Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site LF-1E and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Seven natural vegetation cover types occur on the site, including examples of both upland and lowland deciduous forest. No special vegetation associations are present. A portion (26 ha) of a Significant Environmental Unit occurs on the site.

A total of 174 plant species is known from Site LF-1E, of which six are considered rare. Wildlife related data indicate the presence of 35 bird species, 12 mammals, seven reptiles and amphibians and two fish. Two mammal species are considered rare.

Forestry related activities include fuelwood harvesting and maple syrup extraction. Some mammal trapping takes place, however hunting is a minor activity. Very little fishing activity has been reported.

The entire area of two Significant Environmental Units and portions of four others occur within the LF-1E site vicinity. Pike spawning occurs in Lyons Creek, Grassy Brook and an unnamed stream draining the northern edge of the site vicinity. Wetlands associated with the margins of the Lyons Creek serve as waterfowl production areas.

Three rare plant species, three rare birds, two rare mammals and one reptile species have been recorded in the site vicinity.

1.0 INTRODUCTION

1.1 BACKGROUND

The Ontario Waste Management Corporation (OWMC) is involved in a five-phase process for the selection of a siting option for facilities to treat liquid industrial and hazardous wastes. This process has incorporated input from a number of areas of expertise including agriculture, biology, hydrogeology, socioeconomics and transportation.

At the end of the third phase of the site selection process, eight candidate sites within the Golden Horseshoe region of southern Ontario were identified (OWMC 1984). Biological factors developed to fulfill OWMC's goal of minimizing environmental impact were among several factors used in selecting the eight candidate sites. Gartner Lee Associates Limited completed the technical input for biology as reported in "Site Selection Process, Phase 3B: Selection of Candidate Sites - Biology" (GLAL 1984f). In that report, Site LF-1E was thought to possess major biological constraints.

This report is a technical appendix to "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology" that documents and interprets field data and available biological information for Site LF-1E. It serves as a data base for comparing the eight candidate sites in the facility siting selection process.

1.2 SCOPE AND OBJECTIVES

As noted earlier, the previous Phase 3B evaluation of Site LF-1E was based primarily on existing data. For this Phase 4A assessment, the existing data base has been up-graded where possible and field work has been conducted on the site. The sampling and analytical elements of the program have been designed to meet study objectives and to provide an adequate basis for site comparisons.

Objectives of the Phase 4A biology study are:

- to describe existing biological conditions, on-site and in the site vicinity;
- to refine and confirm the Phase 3B data base through contact with pertinent agencies, experts and the public for both the site and site vicinity, and through field work on-site;
- to determine the level of constraint associated with biological resources;
- to assess the sensitivity and significance of biological resources; and
- to provide the Site Selection Team with biological assessments to use in refining site boundaries and in the siting option comparison.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The bulk of the existing biological information for Site LF-1E is summarized on two maps and in 11 tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY
METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

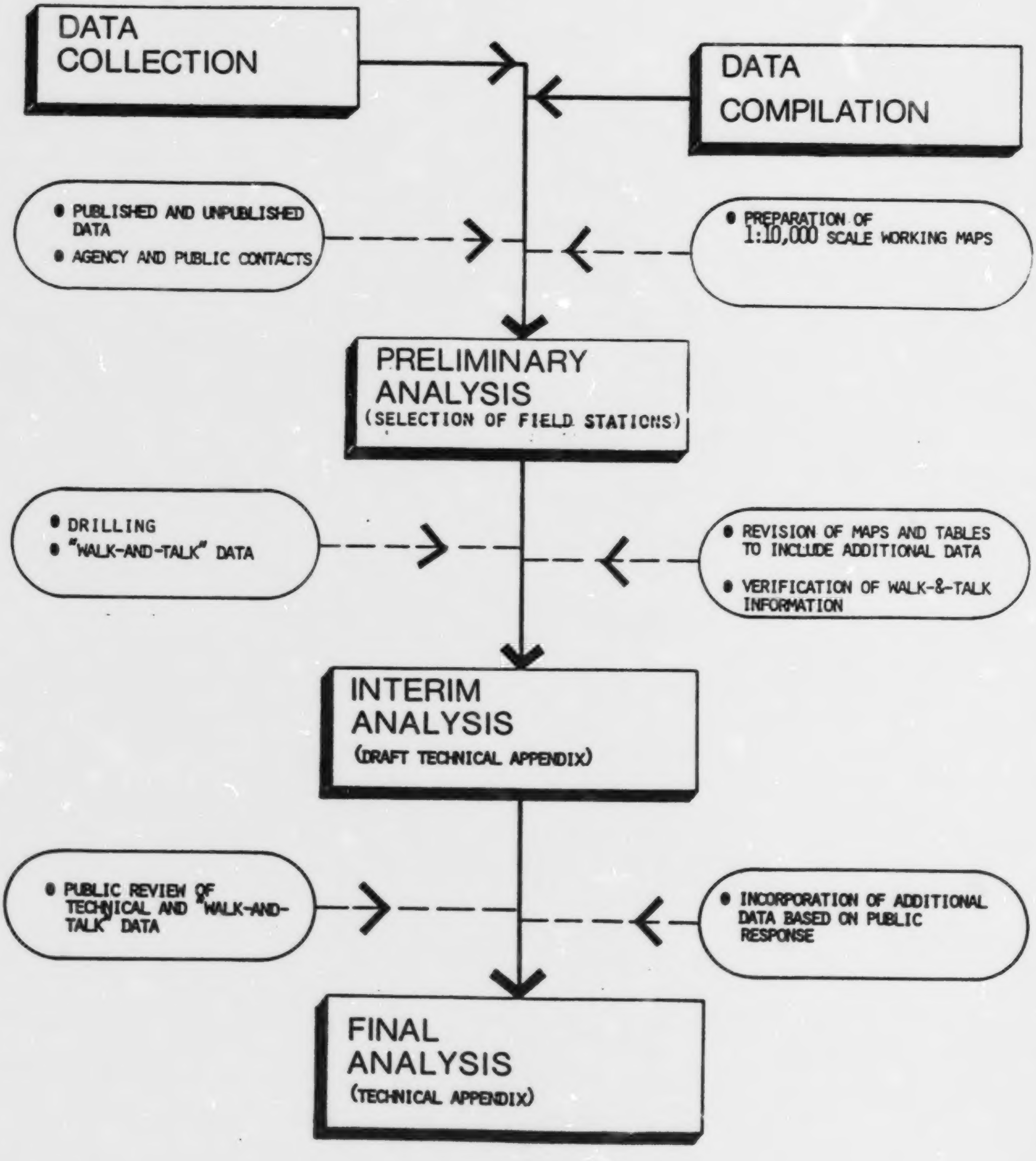
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
• PUBLISHED AND UNPUBLISHED DATA
• AGENCY AND PUBLIC CONTACTS
• PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS (SELECTION OF FIELD STATIONS)
• DRILLING
• "WALK-AND-TALK" DATA
• REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
• VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS (DRAFT TECHNICAL APPENDIX)
• PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
• INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS (TECHNICAL APPENDIX)

Government reports on vegetation and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Niagara Peninsula Conservation Authority and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site LF-1E are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984e), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

An effort was made to verify important features identified prior to field work.

Field studies on Site LF-1E were conducted on September 20 and 21, 1984. Other visits to the site by GLAL biologists occurred on May 15, June 25, September 19, and November 5, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site LF-1E citizens group on August 1, 1984.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and "non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 9.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the LF-1E site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Niagara, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete evidence such as a photograph and/or specimen, and the

potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 9 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences discounted during the preliminary status assessment were not dealt with further. Two of the most common reasons for exclusion were incorrect identifications and changes in status as a result of more recent information.

For example, reports of Wolves (*Canis lupis*) on Site LF-1E are considered erroneous, as this species is often confused with its close relative the Coyote (*Canis latrans*). The Wolf was extirpated from much of southern Ontario prior to 1900 (Campbell and Dagg 1972).

Swamp White Oak (*Quercus bicolor*) was originally designated as rare in Ontario and Canada by Argus and White (1977). A recent status review by Ball (*pers*. *comm*. 1984) has indicated that on the basis of its widespread distribution in southern Ontario, Swamp White Oak should no longer be accorded a rare status. This change will be reflected in a forthcoming publication of the Atlas of Rare Vascular Plants of Ontario Program.

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to species which utilize Site LF-1E and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

A further public meeting to review the preliminary biological information was held on 10 January, 1985. Additional data resulting from public responses were incorporated in the final report.

This technical appendix represents the interpretation of biological features and biological resource use at Site LF-1E to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A" Selection of a Preferred Site(s) - Biology".

3.0 SETTING

3.1 REGIONAL SETTING

Site LF-1E is situated in the eastern portion of the Niagara Peninsula. Its position relative to the other seven OWMC Candidate Sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within acquisition boundaries as portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It is 273 ha in size and includes Lots 5, 6 and 7, Concessions 2 and 3, City of Niagara Falls, Regional Municipality of Niagara. It is bounded on the north by Carl Road, on the south by Schisler Road, on the east by Crowland Avenue and on the west by the Conrail line.

Site LF-1E is located within the corporate limits of the City of Niagara Falls (southwest corner) and is approximately 17 km southeast of St. Catharines, 7 km northwest of Welland, and 9 km west of the Niagara River. The northwest corner of the site lies adjacent to a hydro and railway corridor. Road access is gained via the Queen Elizabeth Way and west following regional roads.

Site LF-1E is located on a portion of the Haldimand Clay Plain. The plain is generally flat to gently rolling.

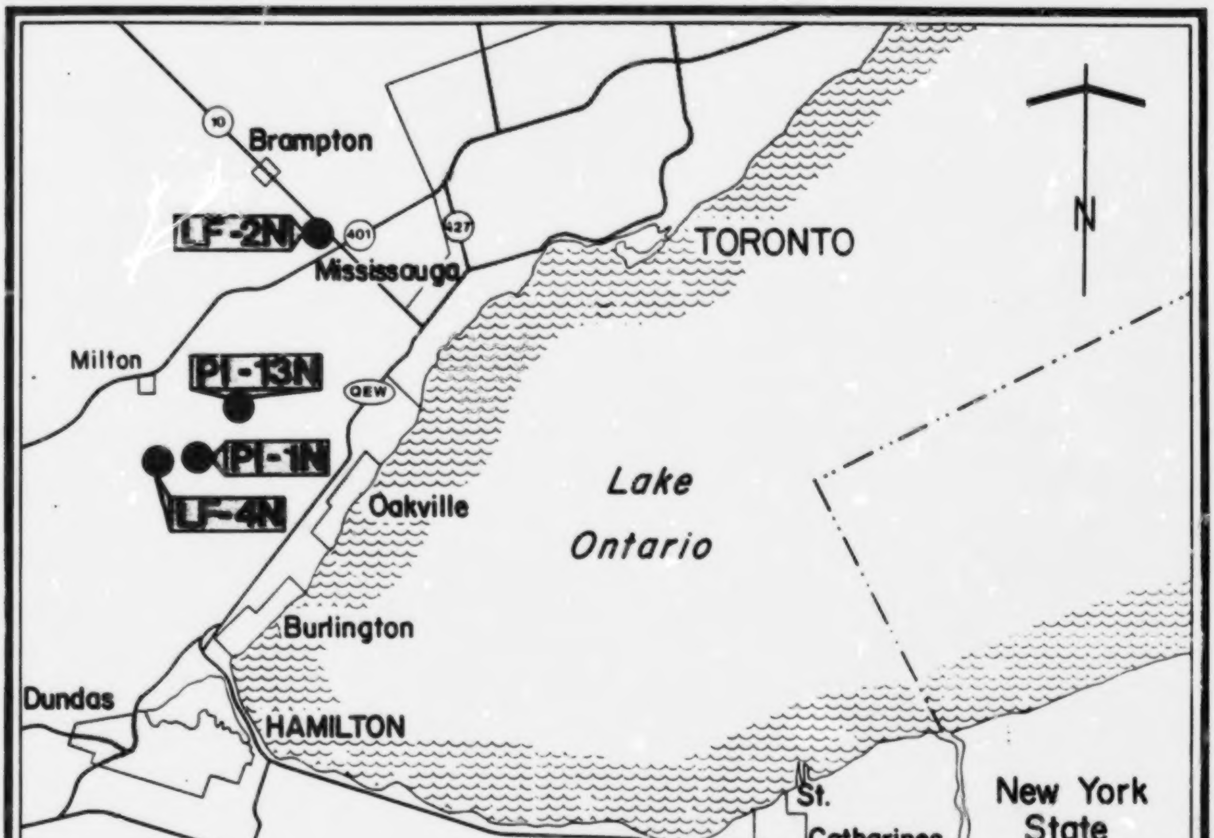
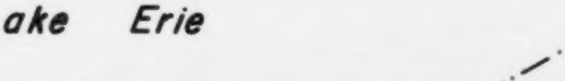

Brampton
LF-2N
401
427
10
TORONTO
Mississauga
N
Milton
PI-13N
QEW
PI-1N
LF-4N
Oakville
Lake
Ontario
Burlington
Dundas
HAMILTON
St.
Catharines
New York
State
20
56
58
Niagara
Falls
Caledonia
LF-9C
20
PI-27E
LF-3C
LF-1E
QEW
Welland
3
3
Fort Erie
Dunnville
Wainfleet
3
Port
Colborne
Lake Erie

FIGURE 2 LOCATION OF CANDIDATE SITES


Miles 8
0
8
16
Kilometres 10
0
10
20

Elevations on site range from about 182 m along the southern boundary of the site to about 180 m along the north boundary. A small knoll immediately east of the site about midway along its eastern boundary rises to an elevation of approximately 185 m. Site LF-1E drains to the Welland River, however, there are no well defined watercourses.

4.0 EXISTING BIOLOGICAL RESOURCES - SITE

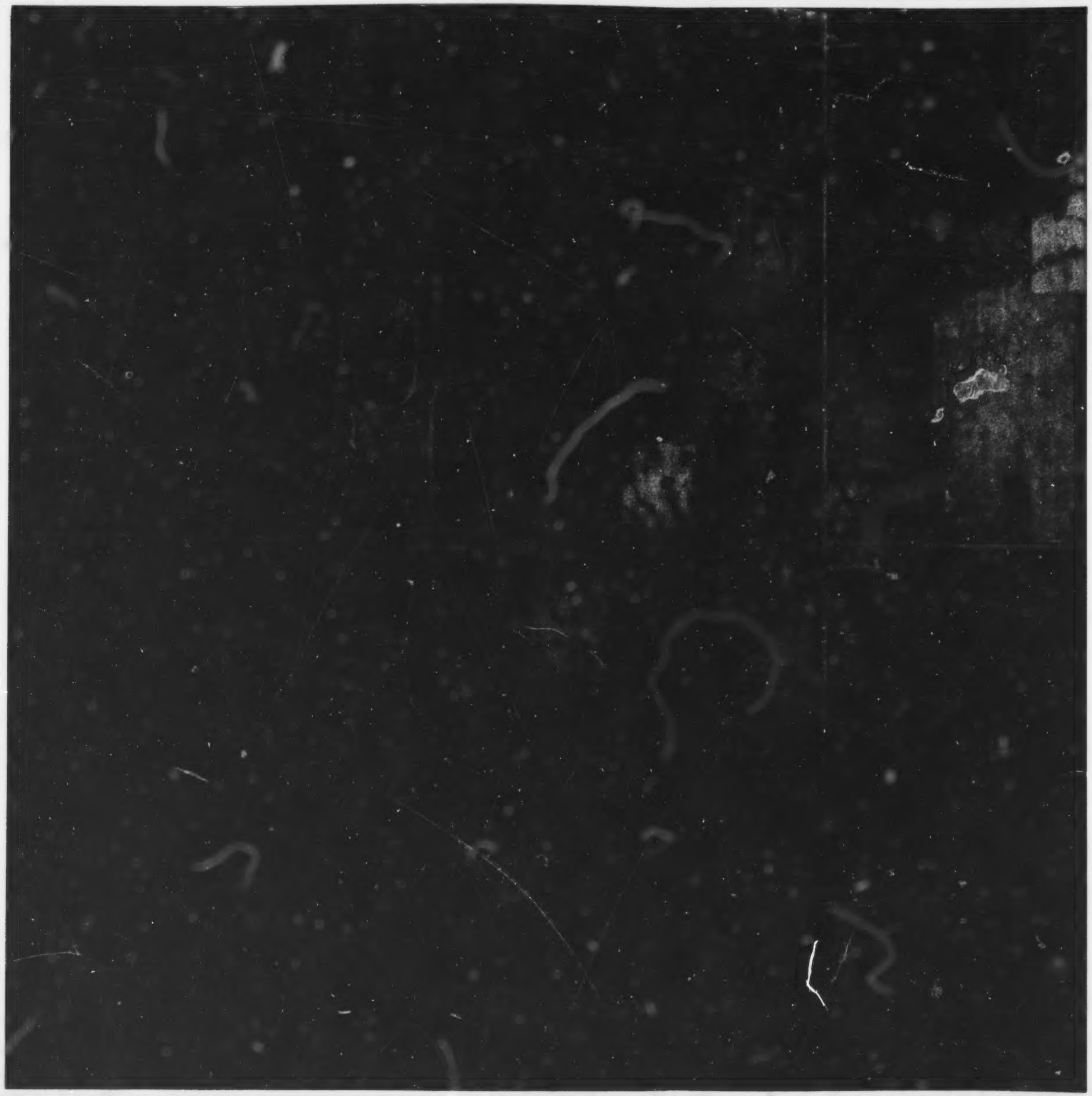
Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

4.1 OVERVIEW OF SITE BIOLOGY

Four deciduous woodlots occur on the site (Figure 3) and collectively occupy approximately 20% of the site area. The dominant overstory species are noted in Section 4.2.2.

Areas of lowland thicket, recently disturbed field, upland coniferous forest, old field and marsh are also present. Approximately 50% of the site is currently in agricultural production.

Thirty-five bird species have been recorded within the acquisition area, 31 of which likely utilize the area for nesting purposes. Twelve species of mammals, seven species of reptiles and amphibians and two fish species have also been recorded from the site.



OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS

- Op Opossum
- Ba American Badger

PLANTS

- Po Pin Oak
- As Spray Aster
- Sa Southern Arrow-wood
- T Tupelo
- Go Hybrid Goldenrod

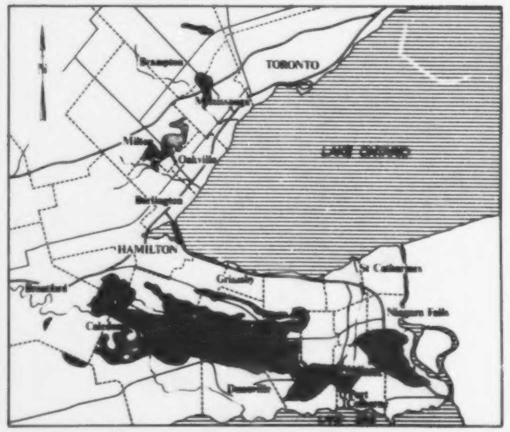
▭ Forestry Potential

▨ Special Vegetation Association/Significant Environmental Unit

19·2 — Unit number
— Candidate area number

Proposed Boundary for Partially Integrated Siting Option * *
Proposed Boundary for Integrated Siting Option (Phase 3B Acquisition Boundary) *

Key Map: LF - 1 East


TORONTO
LAKE ONTARIO
Brampton
Milton
Oakville
Burlington
HAMILTON
Grimsby
St Catharines
Niagara Falls

* Applied in this technical appendix.

** Derived during phase 4A, see "Site Selection Process Phase 4A: Selection of a Preferred Site - Biology"

Scale Bar 500 0 500
250 0 250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 Figure 3

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated in Section 4.2.2.

4.2.1. SPECIES LIST:

A total of 174 plant species has been recorded on Site LF-1E. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Seven natural vegetation associations are present on Site LF-1E. Cropland and unclassified land are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under four major cover type headings:

Forest

The dominant forest cover represented on the site is lowland deciduous with an area of 52 hectares. It occurs in conjunction with upland deciduous woods in four main blocks on the site. The pattern of distribution of these associations is strongly influenced by the existing slough-ridge topography. The upland deciduous component occupies 4 hectares.

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE LF-1E

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Deciduous Forest	4
Lowland Deciduous Forest	52
Upland Coniferous Forest	<1
Lowland Shrub Thicket	5
Recently Disturbed Field	26
Old Field	24
Marsh	6
Other	
Cropland	137
Unclassified	18
TOTAL	273

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting all other cover type areas from the total site area.

A very small (less than 1 ha) coniferous plantation occurs in the southern half of the site.

The common deciduous lowland component present is dominated by Red Maple (Acer rubrum), Pin Oak (Quercus palustris) and American Elm (Ulmus americana).

The upland deciduous forest is dominated by Red Oak (Quercus rubra), White Oak (Quercus alba), Sugar Maple (Acer saccharum) and American Beech (Fagus grandifolia).

Thicket

Approximately 5 hectares of lowland thicket are scattered across the site in small pockets. The patches are confined to wet and wet-mesic sloughs primarily external to wooded areas.

The thicket associations are dominated by Buttonbush (Cephalanthus occidentalis), Narrow-leaved Meadowsweet (Spirea alba) and Gray Dogwood (Cornus racemosa).

Marsh

Marsh areas are associated with sloughs internal and external to the forested land discussed. Figure 3 illustrates the obvious ribbon pattern assumed by this vegetation association. The widely scattered marsh areas occupy 6 hectares.

Some of the marsh vegetation is dominated by robust emergents such as Narrow-leaved Cattail (Typha angustifolia) and Giant Bur-reed (Sparganium eurycarpum).

Other marsh areas are dominated by narrow-leaved emergents (e.g. Rice Cut Grass, Leersia oryzoides), broad-leaved emergents (e.g. Devil's Beggar-ticks, Bidens connata) and floating plants (e.g. Arrow-leaved Smartweed, Polygonum saggitatum).

Field

The site contains a mosaic of old field, recently disturbed field and cropland.

The old field, occupying 24 hectares, is scattered in several patches across the site, being concentrated primarily in the northeast portion. The old field is frequently interspersed with thicket and marsh areas.

Recently disturbed field, occupying 26 hectares, is scattered in large blocks across the site.

The old field present on the site is dominated by non-weedy herbaceous vegetation such as goldenrods (Solidago rugosa, S. nemoralis) and asters (e.g. Aster umbellatus). The recently disturbed field is dominated by weedy herbaceous vegetation such as Common Ragweed (Ambrosia artemisiifolia) and Perrenial Sow-thistle (Sonchus arvensis).

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS:

Special associations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distribution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars. No special associations are found on Site LF-1E.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Two portions of the Horse Track Woodlot (SEU 19-2) occur on Site LF-1E (Figure 3). Collectively they occupy 26 ha (approximately 10%) of the total site area. The Horse Track Woodlot has been identified as an Environmentally Sensitive Area (Brady *et al*.1980a). These lowland deciduous woodlots are dominated by an overstory association of Sugar Maple/American Beech/Swamp White Oak /Red Oak. Brady *et al*.(1980a) note the presence of several rare plant species in this SEU.

4.3 FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Thirty-five bird species, 12 mammal species, seven reptile and amphibian species and two fish species have been recorded on Site LF-1E. Master species lists are presented in Tables 6 through 9.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

Approximately 6 ha of marsh are present in more than 50 small patches scattered throughout the site. These marsh pockets probably support frogs, turtles and some marsh birds.

An intermittent, unnamed creek which drains into Lyons Creek flows through the southern portion of the site.

4.3.3 EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Seven natural vegetation cover types occur on Site LF-1E. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site LF-1E cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

Approximately half of Site LF-1E (137 ha) is currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer, (*Odocoileus virginianus*) and granivorous birds) as food sources but rarely support nesting birds. Recently disturbed fields (26 ha) may provide suitable breeding habitat for a number of ground-nesting birds (e.g. Bobolink (*Dolichonyx oryzivorus*)) and small rodents (e.g. Meadow Vole (*Microtus pennsylvanicus*)). However, this vegetation cover type is most important as terrestrial wildlife habitat in later stages of plant succession. Old field habitat on Site LF-1E (24 ha), is a potential breeding area for both ground and shrub-nesting birds such as Eastern Kingbird (*Tyrannus tyrannus*), Gray Catbird (*Dumetella carolinensis*), Yellow Warbler (*Dendroica petechia*), Song Sparrow (*Melospiza melodia*), and American Goldfinch (*Carduelis tristis*).

Forests

The interface between field and forest habitats is occupied by "edge" species. Although narrow, the "edge" ecotone typically provides the greatest diversity of vegetation types and thus supports a correspondingly high number of wildlife species (Taylor and Taylor 1979).

The breeding bird community associated with "edge" species on Site LF-1E is likely an overlapping one, comprised of both field and forest dwellers. Woodlot margins are also favoured by Coyotes, Red Fox (*Vulpes vulpes*) and deer.

The structure and diversity of the breeding bird community associated with the deciduous forest types on Site LF-1E are strongly influenced by the vertical complexity of the vegetation. These second-growth woodlots have attained an intermediate stage of succession and are characterized by stands of pole-sized trees with a moderately dense understory of saplings and shrubs.

The avian niches provided by second-growth woods are typically suited for occupation by insectivores and omnivores (Samson 1979), most of which forage on the ground or at a low elevation. Canopy dwellers are probably absent from this immature forest type. Typical breeding birds which may be associated with the upland and lowland deciduous woods on Site LF-1E include Downy Woodpecker (*Picoides pubescens*), Northern Flicker (*Colaptes auratus*), American Crow (*Corvus brachyrhynchos*), Brown Thrasher (*Toxostoma rufum*), American Robin (*Turdus migratorius*), Ovenbird (*Seiurus aurocapillus*) and Yellow Warbler.

Hollow trees provide den sites for Opossums (*Didelphis virginiana*), Raccoons (*Procyon lotor*) and squirrels.

Thicket

Low-lying wet thickets provide potential nesting habitat for Alder Flycatchers (*Empidonax alnorum*), Yellow Warblers, Common Yellowthroats (*Geothlypis trichas*) and Swamp Sparrows (*Melospiza georgiana*).

Marsh

Several poorly drained depressions support scattered patches of marsh vegetation. These wet, grassy areas likely attract nesting Red-winged Blackbirds (*Agelaius phoeniceus*).

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds. No special habitats are found on Site LF-1E.

4.4 RARE SPECIES

4.4.1 INTRODUCTION:

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation. These are indicated in Tables 5 through 9 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed in Sections 2.2 and 7.1 of this technical appendix and in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

To make information presentation more logical, indicators of rare species are not used to divide the discussion. Rather, rare species discussions are organized by life form (animals and plants) and species. Each indicator is addressed within each species discussion.

The approximate locations of rare species occurring on the site are mapped in Figure 3 at an original scale of 1:5,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species where, for example, several individuals are found in close proximity to one another. Information concerning actual numbers of individuals of rare species and their on-site distribution is presented later in this section and in Table 2.

However, it should be emphasized that existing rare species data are based on preliminary investigations. Further on-site field work could result in an increase in both the numbers and individuals of rare species.

4.4.2 RARE ANIMAL SPECIES:

Two mammal species which have been reported from Site LF-1E, the Opossum and the American Badger (*Taxidea taxus*), are considered to be rare. Approximate on-site locations are noted in Figure 3.

Opossum

The present distribution of this species in southern Ontario is confined to the north shore of Lake Erie, the Niagara Peninsula and the Thousand Island region (van Zyll de Jong 1983). Of sporadic occurrence, Opossums appear to have invaded Ontario from Michigan and New York (Peterson and Downing 1956). They are almost exclusively restricted to the Deciduous Forest Region (Rowe 1972), where they are generally able to withstand moderate winter conditions.

There are four recent reports of Opossum on Site LF-1E (Cowan, *pers. comm.* 1984; McCracken, *pers. comm.* 1984; Terreberry, *pers. comm.* 1984; Warner, A., *pers. comm.* 1984). Although rare throughout much of southern Ontario, at present this marsupial appears to be locally uncommon in Niagara R.M. The regional status of the Opossum may change however, as populations tend to undergo rapid fluctuations in response to changing climatic conditions (Hamilton 1958).

American Badger

In southwestern Ontario, badgers are generally restricted to areas near the north shore of Lake Erie, with the majority of recent records from Kent and Middlesex Counties and Haldimand-Norfolk R.M. Although Lintack and Voigt (1983) do not cite any recent or historical records for Niagara R.M., there is a convincing badger report from Site LF-1E. An individual was encountered by a site resident (McCracken, pers. comm. 1984) during the winter of 1983-84. Mr. McCracken was positive of his identification and made reference to the animal's pugnacity.This aggressive behaviour is a well known trait of the American Badger (Banfield 1974).

4.4.3 RARE PLANT SPECIES:

Four of the six rare plant species found on LF-1E are considered to be rare in both Ontario and Canada. Pignut Hickory (Carya glabra), Pin Oak and Tupelo (Nyssa sylvatica) are rare according to Argus and White (1977) and Southern Arrow-wood (Viburnum recognitum) is rare according to Argus and Keddy (undated).

The sixth rare species is a hybrid goldenrod, (Solidago caesia X S. canadensis). It is rarely reported in Canada (Semple, pers. comm. 1984). The seventh rare species, Spray Aster (Aster pilosus), is considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

Relative population sizes and distribution patterns of rare plant species on Site LF-1E were determined from field observations conducted by Gartner Lee Associates Limited and other sources (Brady et al.1980a, 1980b). Numbers of individuals were noted within field study plots. These totals were supplemented by observations made between sampling stations.

Pignut Hickory

The distribution of this species on the site is unknown. It was reported from the Horse Track Woodlot Environmentally Sensitive Area (SEU 19-2) by Brady et al. (1980a). Portions of the ESA fall both on and off-site and it cannot be concluded from background field notes (Brady et al. 1980b) where the species occurs.

Pignut Hickory, generally an upland species intolerant of shade (Hosie 1979), is considered rare in both Ontario and Canada (Argus and White 1977). It is not considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

Pin Oak

This species was encountered very frequently during GLAL field work in all the lowland deciduous woods on the site. A species which is intolerant of shade (United States Department of Agriculture 1965), the largest concentrations of Pin Oak on Site LF-1E appear closely associated with woodland edges. Fifty-six specimens were recorded from 13 sample plots. Many others were observed along the field transect external to plots. In some places Pin Oak forms pure stands and in others is the dominant canopy species.

This species is considered rare in both Ontario and Canada (Argus and White 1977). This status is currently under review by the Atlas of Rare Vascular Plants in Ontario Program and is not expected to change (Ball, pers. comm. 1984).

Zander and Pierce (1979) do not consider Pin Oak rare in the Niagara Frontier Region.

Tupelo

Five trees were recorded during GLAL field work, all from one station. Three were overstory specimens averaging 20 cm diameter at breast height (dbh) and two were saplings. All five were associated with the mesic margin of an intermittent slough.

While designated rare in Ontario and Canada (Argus and White 1977), Tupelo is not considered to be rare in the Niagara Frontier Region (Zander and Pierce 1979).

Southern Arrow-wood

Two specimens of this shrub were recorded at two stations on Site LF-1E, both associated with wet and wet mesic habitat.

Although considered rare in Ontario and Canada (Argus and Keddy, undated), Southern Arrow-wood is not accorded rare status in the Niagara Frontier Region (Zander and Pierce 1979).

Hybrid Goldenrod

Solidago caesia x *S. canadensis* was found at one station on the northwestern edge of the candidate site.

The lowland deciduous vegetation association at this station is dominated by a moderate canopy of Red Maple and Pin Oak.

One specimen of this hybrid goldenrod was recorded near the woodlot edge. Other apparently similar goldenrods were observed nearby.

Pringle (1983) reports the first documented record of this hybrid in Canada. His record was from Frontenac County in Ontario and was associated with old field habitat. Semple (*pers. comm.* 1984) calls it "a local phenomenon", rarely reported in Canada. Hybrids can be expected between any two goldenrod species with the same chromosome number. The infrequent encounter of this particular hybrid may be due in part to the limited distribution of *Solidago caesia* (Semple, *pers. comm.* 1984).

Spray Aster

This species was recorded at two sampling stations on the site, both in old field habitat. Several asters, similar in appearance to that collected for verification, were observed at both stations.

Spray Aster is considered rare in the Niagara Frontier Region (Zander and Pierce 1979). The aster was recently delisted from the Atlas of Rare Vascular Plants in Ontario and included with a more common variety for taxonomic reasons (Argus and Keddy, undated; Semple, *pers. comm.* 1984).

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered are: forestry, trapping, hunting and fishing. Resource use has been identified as a biological factor, the rationale for which is provided in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.5.1 FORESTRY:

Forestry potential (Figure 3) refers to wooded areas which could be commercially logged for sawlogs, veneer logs and fuelwood.

On-site assessments of forestry potential were made by GLAL on the basis of the following criteria: size of woodlot, species composition, age and size of trees, accessibility and aspect. Deciduous upland forests generally have a greater potential than deciduous lowland forests, although both cover types are considered.

Additional information pertaining to the forestry potential of Site LF-1E was provided by the Ontario Ministry of Natural Resources (OMNR) and questionnaire responses.

The bulk of the woods on-site are deciduous lowland (52 ha) with smaller pockets of deciduous upland (4 ha) interspersed. A small (<1 ha) coniferous plantation is also present.

The lowland deciduous forest dominants include Red Maple and Pin Oak. While lowland species are generally of less forestry value than upland species, both trees may be harvested for flooring, furniture and plywood (Hosie 1979).

The lowland species are generally more defective, difficult to manage and respond poorly to thinning (OMNR 1974, 1978).

Much of the site's forest is composed of pole-sized material appropriate for fuelwood thinning operations.

There are four major blocks of forest on the site, in the northwest, northeast, southeast and southwest corners.

All except the southwest woodlot are similar in composition and structure. The woods are predominantly pole-sized with some more mature pockets present.

There are some trees present which offer potential as sawlogs and veneer logs, as well as a large volume of material which could be harvested as fuelwood. They include specimens of Red and White Oak, and American Beech.

The woods in the southwest site area are less mature and are frequently interrupted by wet, marsh-dominated swales. Evidence of heavy past logging is apparent, especially in the northern half of this woodlot. The sapling layer is consequently very dense. The forestry value of this woodlot is of lesser consequence than the other three woodlots on-site.

There is very limited potential for maple syrup production due to the scarcity of Sugar Maple trees and upland deciduous habitat.

The coniferous plantation is too small (<1 ha) to be of commercial value.

According to the Ontario Ministry of Natural Resources (1984b), Site LF-1E "is capable of producing high quality sawlogs". The trees on this site are considered to be "of high value and are readily marketable" (OMNR 1984b). Although several hectares of lowland deciduous forest have recently been cut over, no commercial logging operations occur on-site.

Cutting fuelwood for personal consumption appears to be the major forestry activity on Site LF-1E. Questionnaire results indicate that a number of the site residents take firewood from the property. Forestry activities of secondary importance are maple syrup extraction (Silverthorn, pers. comm. 1984; Kretz, pers. comm. 1984) and harvesting of fruit trees (Terreberry, pers. comm. 1984).

Within a regional context, forestry is not a significant resource use on Site LF-1E. Forestry activities to date do not appear to have had a negative impact on associated wildlife populations. Woodlot management in the form of thinning or the culling of dead and diseased trees may have actually improved the quality of available wildlife habitat.

4.5.2 TRAPPING:

Site LF-1E lies within a trapping area which is worked by three licensed trappers (OMNR 1984b). Only two, however, actually trap on portions of the site itself. Between 20 and 30 Muskrats (*Ondatra zibethicus*) were trapped in 1983-84 (Sider, *pers. comm.* 1984). This was done to protect crayfish raised in ponds as bait.

Comparable numbers of Red Fox and Raccoon were taken from roadsides and upland areas in 1983-84 (Chambers, *pers. comm.* 1984). Both Sider (*pers. comm.* 1984) and Chambers (*pers. comm.* 1984) report that population levels of these mammals have remained consistent over the past three or four years.

4.5.3 HUNTING:

Site LF-1E is described as a "good general deer hunting area" (OMNR 1984b). However only one landowner (Kretz, *pers. comm.* 1984) specifically mentions the occurrence of deer hunting on the site. Questionnaire responses indicate that upland game hunting for fox, rabbit and pheasant also takes place on Site LF-1E (Chambers, *pers. comm.* 1984; Cowan, *pers. comm.* 1984).

Hunting activity is apparently not a significant biological resource use on this site.

4.5.4 FISHING:

Fisheries resource use on Site LF-1E appears to be largely restricted to the raising of crayfish. Nineteen man-made ponds grouped together in the centre of the site are employed for this purpose (Watson, *pers. comm.* 1984).

Biggar (*pers. comm*. 1984) and Merritt (*pers. comm*. 1984) contend that Northern Pike (*Esox lucius*) are occasionally taken from the unnamed creek situated in the southern portion of the site. However, since this watercourse is subject to an intermittent flow, its significance as a pike spawning and fishing area is probably limited.

4.6 SUMMARY - SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to represent the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology."

Table 2 Summary Site Biological Resources LF-1 E

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURCE USE			
Name	No. of Individuals	Distribution	Species List	Aquatic Habitat	Terr. Wild-Life Hab.	Special Habitats	Species List	Area Nat. Vegetation	No. of Cover Types	Special Assoc./SEU	Forestry	Trapping	Hunting	Fish
●Opossum	4 reported	throughout site	● 35 bird species ● 12 mammal species ● 7 reptile and amphibian species ● 2 fish species	● unnamed tributary of Lyons Creek	● 7 natural veget. cover types ● approx. 60 ha of forest ● some thicket marsh and old field habitat ● habitat for forest edge, wetland and field communities	● none	● 174 plant species	● Upland Deciduous Forest <4 ha ● Lowland Deciduous Forest 52 ha ● Upland Coniferous Forest <1 ha ● Lowland Shrub Thicket 5 ha ● Recently Disturbed Field 26 ha ● Old Field 24 ha ● Marsh <6 ha	● 7 natural vegetation cover types - see list to left	● portion of SEU 19-2 (Horse Track Woodlot on site (26 ha)	● fuelwood harvest ● maple syrup extraction ● site is capable of producing "high quality" sawlogs (OMNR) ● limited potential for sawlogs and veneer logs in near future ● potential for fuelwood thinning	● 3 licensed trappers on site (OMNR) ● small numbers of Muskrat, Red Fox, Raccoon taken annually	● some deer, upland game hunting ● minor activity	● 19 crayfish ponds ● minor fishing activity reported
●American Badger	1 reported	southeast corner												
●Spray Aster	2 found	north-central and southeast woods												
●Pignut Hickory	reported	northeast and/or southwest woods												
●Pin Oak	56 found	lowland deciduous woods												
●Tupelo	5 found	woods eastern edge of site												
●Southern Arrow-wood	2 found	northwest and southeast woods												
●Hybrid Goldenrod	1 station found	northwestern edge of site												

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

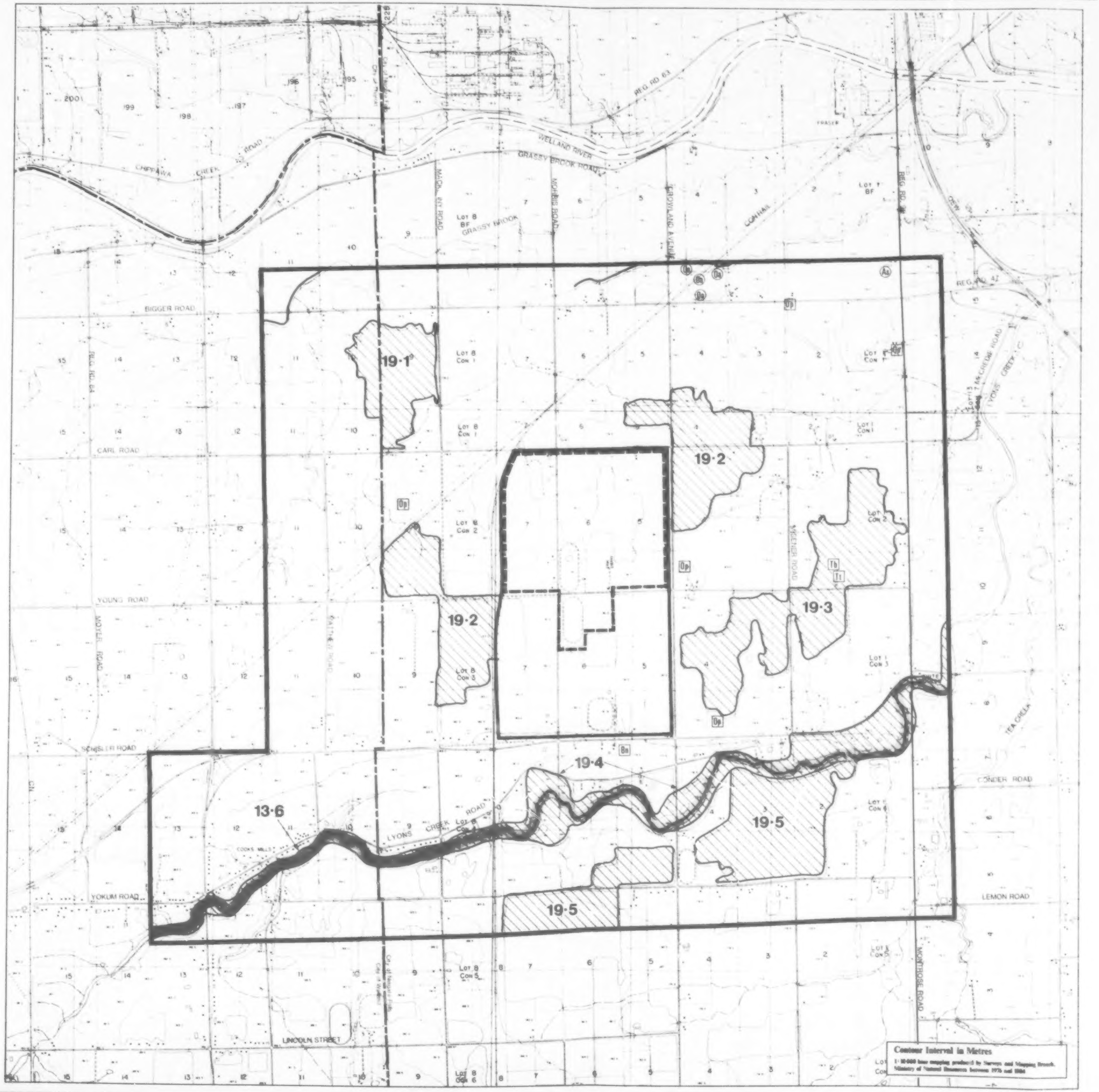
5.1 INTRODUCTION

Site vicinity is defined as the area which lies outside Site LF-1E within approximately a 2.0 km radius of the acquisition boundary. The LF-1E site vicinity boundary is delineated in Figure 4 and referred to as "Site Vicinity Study Area Boundary".

A total of 84 plant species has been recorded in the site vicinity (Table 5). Ninety-four of the 122 bird species known from the site vicinity are permanent or summer residents which possibly breed in the area (Ontario Breeding Bird Atlas 1984; Table 6). An additional 23 species of mammals, four species of amphibians and reptiles and 17 species of fish are known to occur in the site vicinity (Tables 7 through 9 respectively).

In general, the pattern of vegetation cover types found throughout the site vicinity is similar to that which exists on the site itself.

Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations, and rare species.



WELLAND RIVER
GRASSY BROOK ROAD
CHIPPAWA CREEK ROAD
REG. RD 63
BIGGER ROAD
CARL ROAD
YOUNG ROAD
SCHISLER ROAD
YOKUM ROAD
LINCOLN STREET
LYONS CREEK ROAD
CONDER ROAD
LEMON ROAD
MONTROSE ROAD
GRASSY BROOK
LYONS CREEK
TEA CREEK
19·1
19·2
19·3
19·4
19·5
13·6
Lot 8 Con 1
Lot 8 Con 2
Lot 8 Con 3
Lot 8 Con 5
Lot 8 Con 6
Contour Interval in Metres
1:10 000 base mapping produced by Surveys and Mapping Branch, Ministry of Natural Resources between 1976 and 1984

OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS	PLANTS
Op Opossum	Oa Pin Oak
Bn Northern Bobwhite	As Spray Aster
Tt Tufted Titmouse	
Tb Blanding's Turtle	

Significant Environmental Units

▨ ESAs, ANSIs and AIBRs

13·3 Unit number
Candidate area number

Significant Fish and Wildlife Features

〰 Pike Spawning Areas

☐ Important Waterfowl Production Areas

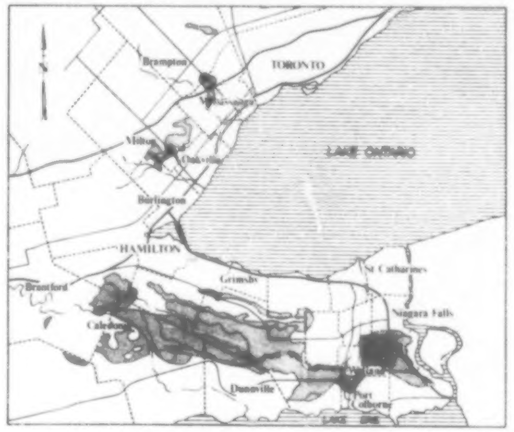
Proposed Boundary for Partially Integrated Siting Option

Proposed Boundary for Integrated Siting Option (Phase 3B Acquisition Boundary)

Site Vicinity Study Area Boundary

Key Map: **LF-1 East**

Lots 5, 6 and 7: Concessions II and III; City of Niagara Falls; formerly in the Township of Crowland



TORONTO
Brampton
LAKE ONTARIO
Milton
Oakville
Burlington
HAMILTON
Brantford
Grimsby
St Catharines
Niagara Falls
Caledonia
Dunnville
Port Colborne

1000 feet 0 1000
500 metres 0 500

EXISTING BIOLOGICAL CONDITIONS, PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

September 1985 FIGURE 4

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definitions of these units and the rationale for considering them as a biological factor are described in the "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The entire area of two SEUs and portions of four others occur within the LF-1E site vicinity (Figure 4). Areas of the five natural vegetation cover types represented in SEUs are noted in Table 3.

Lyons Creek (SEU 13-6) has been identified as an ESA by the Regional Municipality of Niagara (1981). However, in its Policy Plan the boundaries of this SEU have not been precisely defined nor have its biological amenities been documented in detail. Lyons Creek is also regarded as an Area of Important Biological Resources (OMNR 1983a). It flows through the southeast corner of the site vicinity and at its closest point, is situated 350 m from the site itself. This wetland complex is considered to be of "local significance" as a waterfowl production and staging area (OMNR 1984e), provides breeding or feeding habitat for an unspecified "provincially significant animal species" (OMNR 1984e), and is a spring spawning area for Northern Pike (OMNR 1984d).

TABLE 3: AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, LF-1E.

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
SEU	
Deciduous Forest	299
Mixed Forest	5
Coniferous Forest	<1
Thicket	3
Successional Field	2
OTHER	
Deciduous Forest	223
Mixed Forest	4
Coniferous Forest	21
Thicket	11
Successional Field	64
Wetland	10
TOTAL	643

*Areas are approximate and are rounded to whole numbers.

Pike spawning in Lyons Creek is "relatively important" in the District context (OMNR 1984d). This watercourse has been described as having the highest pike production in the entire Niagara River watershed (OMNR 1984d).

Black-crowned Night-Herons (Nycticorax nycticorax) reportedly nested near Lyons Creek "within the past five years" (OMNR 1984e). Apparently this heronry is no longer active. No mention is made of the size or specific location of this heronry. It is not known whether it occurred in that portion of Lyons Creek which occupies the site vicinity.

The McKenny Road Woodlot (SEU 19-1) is a 31 hectare woodlot situated in the northwest corner of the site vicinity. It is 650 m from Site LF-1E at its closest point. The overstory vegetation of this woodlot is dominated by an association of maple/oak/beech/ash. The McKenny Road Woodlot has been designated as an ESA by Brady et al. (1980a) due to the presence of several rare plant species.

Portions of the Horse Track Woodlot (SEU 19-2) lie immediately adjacent to the northeast and southwest corners of Site LF-1E. The overstory stratum of this 115 ha woodlot is dominated by a maple/beech/oak association. On the basis of having fulfilled one ESA criterion, the presence of rare species, this area has been designated as an ESA (Brady et al. 1980a).

The Young Woodlot (SEU 19-3) occupies the east central portion of the site vicinity to within approximately 60 m of the site itself. This 64 ha area is characterized by disturbed, second growth woodland. The Young Woodlot contains several rare plant species and as such, has been accorded ESA status (Brady et al. 1980a).

A portion of the Lyons Creek Floodplain Wetland (SEU 19-4) overlaps SEU 13-6 (Figure 4). This particular section of Lyons Creek has been identified as an ANSI by Macdonald (1980). This 73 hectare area represents a diverse wetland complex occupying the flooded basin of an incised meander stream basin. Macdonald (1980) considers this ANSI to be "the best interior wetland community recorded for an incised meander stream basin in the region". It is situated 300 m from Site LF-1E at its closest point.

The Yokom Woodlot (SEU 19-5) is an 82 hectare site dominated by a mature overstory association of Sugar Maple/Red Oak/White Oak/American Beech. It is situated 500 m from Site LF-1E at its closest point. The area satisfies two of the ESA criteria established by Brady et al. (1980a). The Yokom Woodlot is a water storage and headwater area for Tea Creek and Lyons Creek and contains several species of rare plants. The western portion of the Yokom Woodlot (also referred to as the Southeast Cooks Mills Forest) is also recognized as an ANSI (Macdonald 1980). It represents "a good example of clay plain landform and oak-maple lowland forest and slough zone communities" (Macdonald 1980).

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

Fish Spawning Areas

As noted in Section 4.5.4, Northern Pike spawn in Grassy Brook, which flows through the northwest corner of the site vicinity (Figure 4). Although fisheries population statistics for this watercourse are unavailable, pike spawning is "not significant" in a District context (OMNR 1984a).

The unnamed stream which drains the north-central portion of the site vicinity is also thought to support a pike spawning run (Figure 4).

Fish spawning areas associated with SEUs are discussed in Section 5.2.

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within that portion of the site vicinity which is not designated as SEU. Six natural vegetation associations are represented in the site vicinity. The approximate area of each vegetation association is indicated in Table 3. In general, the site vicinity vegetation is of similar structure and composition to that studied on Site LF-1E.

Forest

A mix of deciduous, coniferous and mixed forest is present in the site vicinity. The deciduous woods represent the largest component of non-SEU natural vegetation, occupying approximately 223 hectares.

The woods are fragmented and widely scattered blocks varying from less than one to about 12 hectares in size.

One small block of mixed forest (4 ha) occurs on the eastern edge of the site vicinity. It is a coniferous plantation now becoming overgrown with deciduous tree species. Another smaller pocket occurs on the western edge of the vicinity.

Thicket

Thicket lands (11 ha) are scattered throughout the vicinity, often associated with woodlot edges.

Wetland

Wetlands in the vicinity occupy approximately 10 hectares, associated with Lyons Creek, Tea Creek, minor drainage swales, and depressions.

Successional Field

Large blocks of successional field occur throughout the vicinity and occupy a total of 64 hectares.

Since no field work was conducted in the site vicinity, the significance of site vicinity natural vegetation units as wildlife habitat can only be speculated upon. Most of the woodlots found in the site vicinity are substantially larger in area than those found on the site itself and may harbour a greater diversity of wildlife. Although highly fragmented, the forested areas scattered throughout the site vicinity may collectively function as travel corridors for wildlife, linking larger wooded tracts. Lyons Creek, in particular, functions as an important migration corridor.

5.5 RARE SPECIES

The approximate locations of rare species occurring in the site vicinity are mapped in Figure 4 at an original scale of 1:10,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species, where, for example, several individuals are found in close proximity to one another. For information concerning actual numbers of individuals of rare species and their on-site distribution, the reader is referred to the accompanying text of Section 5.5.

5.5.1 RARE ANIMAL SPECIES:

Three rare birds, two rare mammals, and one rare reptile have been reported from the LF-1E site vicinity.

Red-shouldered Hawk (Buteo lineatus)

Formerly a common summer resident in Niagara R.M., the Red-shouldered Hawk is now "quite rare" (Sheppard 1970). Risley (1982) considers it absent as a breeding species south of Hamilton-Wentworth and Waterloo Regional Municipalities. Folemsbee's (undated) suggestion that this raptor may nest in Lyons Creek is probably based on the species' former status, rather than on any recent information. It has yet to be recorded in the 10 km square unit surrounding Site LF-1E by the Ontario Breeding Bird Atlas Project (Ontario Breeding Bird Atlas 1984). The Red-shouldered Hawk should be considered reginally rare, if breeding is confirmed.

Northern Bobwhite (Colinus virginianus)
Knapton (pers. comm. 1984) encountered a singing male Northern Bobwhite immediately adjacent to the southern boundary of Site LF-1E in the summer of 1984 (Figure 4).

All native Bobwhite are believed to have been extirpated in Niagara R.M. and present sightings involve introduced birds (Beardslee and Mitchell 1965). Sheppard (1970) mentions the existence of several coveys in Willoughby Township near Chippawa circa 1950. Two hundred and fifty birds were released in what was formerly referred to as Lincoln County in 1961 (Dorst 1961).

This species appears to be a rare and local breeding species in the Regional Municipality of Niagara. Because of its widespread decline in southern Ontario during this century, the Northern Bobwhite is considered provincially rare by Eagles and McCauley (1982).

Tufted Titmouse (Parus bicolor)
In the LF-1E site vicinity, a Tufted Titmouse has been reported from the Young Woodlot area (Coville, pers. comm. 1984). Although several kilometres outside the site vicinity, a singing male was encountered near Cyanamid Corners in the summer of 1984 (Knapton and Foley 1984).

The Tufted Titmouse is a southern species of "erratic" occurrence in the Niagara Region. Beardslee and Mitchell (1965) report that the species' status ranges from "uncommon" to "very rare". Although most Niagara R.M. records refer to wintering birds, a pair of Tufted Titmice apparently nested at Point Abino in 1966 (Sheppard 1970). Eagles and McCauley (1982) cite a 1971 Port Colborne breeding record.

The Tufted Titmouse is decribed as a "rare permanent resident" in southern Ontario (James _et_ _al_. 1976). The species is considered to be a provincially rare breeding bird by Eagles and McCauley (1982).

Opossum

Opossums have been reported from five locations within the site vicinity (Pietrangelo, Ms. D., _pers_. _comm_. 1984; Morris, G., _pers_. _comm_. 1984; Morris, J., _pers_. _comm_. 1984; Munderich, _pers_. _comm_. 1984; Figure 4). For the provincial and regional status of this species the reader is referred to Section 4.4.2 of this technical appendix.

Grey Fox (_Urocyon_ _cinereoargenteus_)

Early historical accounts and archaeological excavations indicate that the Grey Fox was once common in southern Ontario as far north as Simcoe County (Wintemberg 1921; Peterson _et_ _al_. 1953). The species was apparently extirpated from the northern limit of its range for a period of approximately 300 years, and only reappeared in Ontario in the middle of this century. According to Banfield (1974), Grey Foxes re-entered Ontario from New York via the Niagara River in 1948. Although the present status of this species in Niagara R.M. is not known, the Grey Fox is probably rare and confined to deciduous riparian woodland. It has recently been reported from the Lyons Creek Valley

(Acres Consulting Services Limited 1978). The exact location is unknown and may not pertain to that portion of Lyons Creek which falls within the LF-1E site vicinity.

Based on a status report prepared by Steers (1978), the Grey Fox was officially designated as "rare" in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1979.

Blanding's Turtle (*Emydoidea blandingii*)

This regionally rare species is included on the basis of unconfirmed reports of "turtles with yellow throats" in the LF-1E site vicinity (GLAL 1984a, *fide* D. Coville). Although this circumstantial evidence suggests the presence of Blanding's Turtle, there are no Niagara R.M. records cited by Logier and Toner (1961). This species is probably uncommon along the shore of Lake Erie, becoming rarer farther inland.

5.5.2 RARE PLANT SPECIES:

Three rare plant species have been recorded in the site vicinity. These are Pignut Hickory, Pin Oak and Spray Aster. All are discussed in greater detail in Section 4.4.3.

The first two species are considered rare in Ontario and Canada (Argus and White 1977). However, they are not designated as such in the Niagara Frontier Region (Zander and Pierce 1979).

Spray Aster is considered rare in the Niagara Frontier Region (Zander and Pierce 1979). The species is no longer considered rare in Ontario and Canada (see Section 4.4.3).

Pignut Hickory

This species has been reported from the Horse Track, Yokom and Young Woodlot ESAs (Brady et al. 1980a). Specific locations are unknown.

Pin Oak

This species has been reported from the Yokom and McKenny Road Woodlot ESAs (Brady et al. 1980a) as well as from two other private properties in the vicinity (Morris, G., pers. comm. 1984; Silverthorn, pers. comm. 1984). Precise locations are unknown. It is also known from that portion of the LF-1E site vicinity which overlaps Site PI-27E (Figure 4).

Spray Aster

The record for Spray Aster refers to that portion of Site PI-27E which is contained in the northeast corner of the LF-1E site vicinity. It was reported from one sampling station on PI-27E, in recently disturbed field habitat.

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information, as summarized in Table 4, provides the background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources LF-1E

FACTORS AND INDICATORS

SIGNIFICANT ENVIRONMENTAL UNITS			FISH AND WILDLIFE FEATURES OF SIGNIFICANCE		OTHER NATURAL VEGETATION	RARE SPECIES
SEU	CRITERIA FOR DESIGNATION	DISTANCE TO SITE	FEATURE	DISTANCE TO SITE		
• 13-6 • Lyons Creek • Niagara Region Official Plan • AIBR (MNR)	• high potential wetland • important resource area	350 m	• Locally Significant Pike Spawning - Grassy Brook - unnamed stream draining northern edge of site vicinity	 - 1.75 km - 1.25 km	• Deciduous Forest 223 ha • Coniferous Forest 21 ha • Mixed Forest 4 ha • Thicket 11 ha • Successional Field 64 ha • Wetland 10 ha	Animals • Red-shouldered Hawk • Northern Bobwhite • Tufted Titmouse • Opossum • Grey Fox • Blanding's Turtle Plants • Pignut Hickory • Pin Oak • Spray Aster
• 19-1 • McKenny Road Woodlot • Brady ESA Study	• rare plant species	650 m				
• 19-2 • Horse Track Woodlot • Brady ESA Study	• rare plant species	- portion (26 ha) in northeast and south-west corner of site - remainder adjacent to site				
• 19-3 • Young Woodlot • Brady ESA Study	• rare plant species	60 m				
• 19-4 • Lyons Creek Floodplain Wetland • Niagara Region Official Plan • AIBR, ANSI (OMNR)	• diverse wetland complex in an incised meander stream basin	300 m				

Table 4 Summary Site Vicinity Biological Resources LF-1 E

FACTORS AND INDICATORS

SIGNIFICANT ENVIRONMENTAL UNITS			FISH AND WILDLIFE FEATURES OF SIGNIFICANCE		OTHER NATURAL VEGETATION	RARE SPECIES
SEU	DISTANCE TO SITE		FEATURE	DISTANCE TO SITE		
• 19-5 • Yokom Woodlot • Brady ESA Study • ANSI (MNR)	• rare plant species • headwater and water storage area	500 m				

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7.0 SPECIES LIST

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 9) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins *et al*. 1982) and fish (Scott and Crossman 1973).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 9. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined; these are sources 1, 6, 14 and 52.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

The most current source of information concerning plant status and distribution in Niagara Region is Flora of the Niagara Frontier Region (Zander and Pierce 1979). Although prepared in New York State, the study area includes Niagara Region in Ontario. It draws upon Ontario literature and provides an accurate reflection of regional plant status.

Other background reports examined included works by Zenkert (1934) and Zander (1976) for the Niagara Frontier Region. Environmentally Sensitive Areas reports by Brady et al. (1980a), Ecologistics Limited (1976) and Eagles et al. (1980) provided additional regional perspectives for plant species distribution and status. The Vascular Plants of Norfolk County (Landon 1960) provided regional data for an adjacent area.

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reports where applicable.

Frequency and relative abundance standards are assigned to Ontario birds by James et al. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for a comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

Two annotated lists of the regonal avifauna were relied upon heavily when determining the status of birds in the Niagara Peninsula. The geographical scope of Beardslee and Mitchell's (1965) account encompasses a large portion of neighbouring New York State, while Sheppard's (1970) treatment is confined to the Ontario side. Previous published lists (Sheppard _et_ _al_. 1936; Sheppard 1939) contain references to the historical status of selected species.

In assigning status, Beardslee and Mitchell (1965) adopt the criteria and terms established by the Federation of New York State Bird Clubs in 1954. These differ somewhat from the criteria used by James _et_ _al_. (1976) to determine status on a provincial level. Terms used by Sheppard (1970) to describe abundance and frequency of occurrence are not defined.

More recent information on the status of breeding birds in the various regions was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April 1984, 20 species of mammals have been designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not adressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammal fauna of the Regional Municipality of Niagara. Information supplied by local naturalists and recognized authorities in the field of mammalogy was largely relied upon to determine the regional status of particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and South Wellington Counties was also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date, however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from the Niagara Region, however they do not assign status. A survey of the amphibians and reptiles of the Niagara Escarpment Planning Area (Campbell 1976) also includes references to Niagara.

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister *et al*. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species, is presently protected in Ontario by "Endangered" species legislation (Ontario Government 1971; OMNR 1977). The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disproportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitative definitions of rarity could be proposed with a considerable degree of confidence. However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of Guelph, and the National Museum of Natural Sciences in Ottawa, were consulted on a number of occassions.

In cases where wildlife data were lacking, lengthy discussions were held wth appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the obseration are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE LF-1E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LYCOPODIACEAE	CLUBMOSS FAMILY		
Lycopodium obscurum L.	Ground-pine	6	
OPHIOGLOSSACEAE	ADDER'S-TONGUE FAMILY		
Botrychium virginianum (L.) Sw.	Rattlesnake Fern	6	
OSMUNDACEAE	ROYAL FERN FAMILY		
Osmunda regalis L.	Royal Fern	6	
DENNSTAEDTIACEAE	BRACKEN FAMILY		
Pteridium aquilinum (L.) Kuhn	Bracken Fern	6	
ASPLENIACEAE	SPLEENWORT FAMILY		
Onoclea sensibilis L.	Sensitive Fern	59,6	
Dryopteris marginalis (L.) A. Gray	Evergreen Wood-fern	1	
D. spinulosa (Muell.) Kuntze	Spinulose Shield-fern	1	
Polystichum acrostichoides (Michx.) Schott	Christmas Fern	6	
Gymnocarpium dryopteris (L.) Newm.	Oak Fern	59	
THELYPTERIDACEAE	BEECH FERN FAMILY		
Thelypteris palustris (Salisb.) Schott	Marsh Fern	6	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
PINACEAE	PINE FAMILY		
Pinus banksiana Lam.	Jack Pine	5,38	5,38,2
P. strobus L.	White Pine	5,38 59	5,38,41, 8,2
P. sylvestris L.	Scot's Pine	6	2
Tsuga canadensis (L.) Carr.	Eastern Hemlock		41
CUPRESSACEAE	CYPRESS FAMILY		
Thuja occidentalis L.	Eastern White Cedar		5,39
TYPHACEAE	CATTAIL FAMILY		
Typha angustifolia	Narrow-leaved Cattail	6	
T. latifolia L.	Cattail		54,55
SPARGANIACEAE	BUR-REED FAMILY		
Sparganium eurycarpum Engelm.	Giant Bur-reed	6	
ALISMATACEAE	WATER-PLANTAIN FAMILY		
Alisma plantago-aquatica L.	Water-plantain	6	
POACEAE	GRASS FAMILY		
Glyceria striata (Lam.) A.S. Hitchc.	Fowl Manna Grass	6	14
Phragmites australis (Cav.) Trin. ex Steudel	Common Reed		6,14
Calamagrostis canadensis (Michx.) Beauv.	Canada Blue-joint	6	54,55
Cinna arundinacea L.	Stout Wood Grass	6	
Leersia oryzoides (L.)	Rice Cut Grass	6	55
Panicum capillare L.	Witch Grass	6	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
CYPERACEAE	SEDGE FAMILY		
Scirpus atrovirens Willd.	Black Bulrush	6	
Carex blanda Dewey.	Sedge	6	
C. convoluta Mack.	Sedge	6	
C. crinita Lam.	Sedge	6	
C. interior Bailey	Sedge	6	
C. lupulina Muhl. ex Willd.	Sedge	6	
C. pensylvanica Lam.	Sedge	6	
C. platyphylla Carey.	Sedge		14
C. scoparia Muhl. ex Willd.	Sedge	6	
C. tribuloides Wahl.	Sedge	6	
C. tuckermani Dewey	Sedge	6	
ARACEAE	ARUM FAMILY		
Arisaema triphyllum (L.) Torr.	Jack-in-the-pulpit	6	41
LEMNACEAE	DUCKWEED FAMILY		
Lemna minor L.	Common Duckweed	6	55
PONTEDERIACEAE	PICKEREL-WEED FAMILY		
Pontederia cordata L.	Pickerel-weed		7
JUNCACEAE	RUSH FAMILY		
Juncus effusus L.	Soft Rush	6	
J. tennuis Willd.	Path Rush	6	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES	
		SITE	VICINITY
LILIACEAE	LILY FAMILY		
Uvularia sessilifolia L.	Sessile-leaved Bellwort	59,*6*	
Allium tricoccum Ait.	Wild Leek	18	29
Lilium canadense var. *michiganense* Farw.	Michigan Lily	*6*	29
Erythronium americanum	Yellow Trout Lily	59	
Maianthemum canadense Desf.	Wild Lily-of-the-valley	59,*6*	
Streptopus roseus Michx.	Twisted Stalk	59	
Polygonatum pubescens (Willd.) Pursh.	Solomon's-seal	59,*6*	
Smilax herbacea L.	Carrionflower	*6*	
S. tamnoides L. var. *hispida* (Muhl.) Fern.	Bristly Catbrier	*6*	
IRIDACEAE	IRIS FAMILY		
Iris versicolor L.	Wild Blue Flag	*6*	39,41
SALICACEAE	WILLOW FAMILY		
Populus deltoides Marsh.	Eastern Cottonwood	38	38,55
P. grandidentata Michx.	Large-toothed Aspen	38,5,*6*	5,38,41
P. tremuloides Michx.	Trembling Aspen	38,5 59	5,38,40,41,39
Salix nigra Marsh.	Black Willow	38,*6*	38,41,5,
JUGLANDACEAE	WALNUT FAMILY		
Juglans cinerea L.	Butternut		5,39
J. nigra L.	Black Walnut	*6*	39,5,29,8
Carya cordiformis (Wang.) K. Koch.	Bitternut Hickory	5,38	5,38,40,39
C. glabra (Mill.) Sweet *	Pignut Hickory	5,38	5,38,41,39
C. ovata (Mill.) K. Koch.	Shagbark Hickory	5,*6* 59	5,38,40,41,39,*14*

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BETULACEAE	BIRCH FAMILY		
Carpinus caroliniana Walt.	Blue Beech	38,5,6,59	5,38,40,41,39,14,53
Ostrya virginiana (Mill.) K. Koch.	Hop Hornbeam	2,38,5,6,59	5,38,40,41,39,2,14
Betula allegheniensis Britt.	Yellow Birch	59	
B. papyrifera Marsh.	Paper Birch	38,5,6,59	5,38,41
Alnus incana (L.) Muench ssp. *rugosa* (Du Roi) Clausen	Speckled Alder		5,39
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech	2,6 59	5,40,41,39,29,2,14,55
Quercus alba L.	White Oak	2,9,38,5,6,59	5,38,41,39,29,2,
Q. bicolor Willd.	Swamp White Oak	38,5 6,1	5,38,40,41,39,3
Q. muehlenbergii Engelm.	Chinquapin Oak	38,5	5,38
Q. palustris Muenchh. *	Pin Oak	58,6 59,1	40,5,39,29,3,58
Q. rubra L.	Red Oak	2,9,6,59	55,40,5,41,39,29,2,54
Q. velutina Lam.	Black Oak	38,5	5,38
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	38,5,6	5,38,40,54,14
U. rubra Muhl.	Slippery Elm	38,5	5,38,40,39
U. thomasii Sarg.	Cork Elm	38,5	5,38,40,41

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
URTICACEAE	NETTLE FAMILY		
Laportea canadensis (L.) Wedd.	Wood Nettle	6	
Boehmeria cylindrica (L.) Schwein.	False Nettle	6	
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex crispus L.	Curled Dock		14
Polygonum saggitatum L.	Arrow-leaved Smartweed	6	
Tovara virginiana (L.) Raf.	Virginia Knotweed		55
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium album L.	Lamb's Quarters	6	
AMARANTHACEAE	AMARANTH FAMILY		
Amaranthus retroflexus L.	Red-root Pigweed	6	
PORTULACACEAE	PURSLANE FAMILY		
Claytonia virginica L.	Spring Beauty	59	
RANUNCULACEAE	BUTTERCUP FAMILY		
Anemone quinquefolia L.	Wood Anemone	59	
Hepatica americana (DC.) Ker.	Blunt-leaved Hepatica	6	
Thalictrum dioicum L.	Early Meadow Rue	6	
BERBERIDACEAE	BARBERRY FAMILY		
Podophyllum peltatum L.	May-apple	6,38 59	6,38,41, 5,39
CRASSULACEAE	SEDUM FAMILY		
Sedum triphyllum (Haw.) S.F. Gray	Orpine	6	14

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
SAXIFRAGACEAE	SAXIFRAGE FAMILY		
Tiarella cordifolia L.	Foam Flower	6	
HAMAMELIDACEAE	WITCH-HAZEL FAMILY		
Hamamelis virginiana L.	Witch-hazel	38,5, 6	5,38,40, 41
ROSACEAE	ROSE FAMILY		
Spirea alba Du Roi	Narrow-leaved Meadowsweet	6	54
Malus domestica Borkh.	Apple	6	
Amelanchier laevis Wieg.	Smooth Serviceberry	6	
Crataegus pruinosa (Wendl.) K. Koch.	Hawthorn	6	
C. *punctata* Jacq.	Hawthorn	59	
Rubus allegheniensis Porter	Common Blackberry	6	
R. *flagellaris* Willd.	Northern Dewberry	6	
R. *pubescens* Raf.	Dwarf Raspberry	6	
Fragaria vesca L.	Wood Strawberry	6	
F. *virginiana* Dene.	Strawberry		6
Potentilla recta L.	Sulphur Cinquefoil		6
P. *simplex* Michx.	Common Cinquefoil	1,6	
Geum allepicum Jacq. var. *strictum* (Ait.) Fern.	Yellow Avens	6	
Rosa blanda Ait.	Smooth Rose	6	
R. *palustris* Marsh.	Swamp Rose	6	
Prunus pensylvanica L. fil.	Pincherry	59	
P. *serotina* Ehrh.	Black Cherry	2,38, 5,6 59	5,38,40, 41,39,2
P. *virginiana* L.	Choke Cherry	6	5,40,39
BRASSICACEAE	MUSTARD FAMILY		
Sisymbrium altissim L.	Tall Sisymbrium	1	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
FABACEAE	PEA FAMILY		
Melilotus alba Desr.	White Sweet-clover		6
Amphicarpa bracteata (L.) Fern.	Hog-peanut	6	
Coronilla varia L.	Axseed		6
GERANIACEAE	GERANIUM FAMILY		
Geranium maculatum L.	Wild Geranium	59,6	
G. robertianum L.	Herb-robert	6	
OXYLIDACEAE	WOOD-SORREL FAMILY		
Oxalis europaea Jordan	European Wood Sorrel	6	
ANACARDIACEAE	CASHEW FAMILY		
Rhus radicans L.	Poison Ivy	6	
R. typhina L.	Staghorn Sumac	5,38	5,38
AQUIFOLIACEAE	HOLLY FAMILY		
Ilex verticillata (L.) Gray	Winterberry	1,6	
ACERACEAE	MAPLE FAMILY		
Acer nigrum Michx. f.	Black Maple	38,5	5,38,40, 41
A. rubrum L.	Red Maple	59,6 1	5,40,41, 39,54,55
A. saccharinum L.	Silver Maple	59,38, 6	38,5,40, 41,39,54
A. saccharum Marsh.	Sugar Maple	38,5, 6	5,14,38, 40,41,39, 55,29
A. spicatum Lam.	Mountain Maple		41

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BALSAMINACEAE	JEWEL-WEED FAMILY		
Impatiens biflora Walt.	Spotted Jewelweed	6	
RHAMNACEAE	BUCKTHORN FAMILY		
Rhamnus cathartica L.	Buckthorn	6	
VITACEAE	GRAPE FAMILY		
Vitis riparia Michx.	Wild Grape	6	
Parthenocissus vitacea (Knerr.) Hitchc.	Virginia Creeper	6	
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	38,5, 6	5,38,40 39,2
VIOLACEAE	VIOLET FAMILY		
Viola conspersa Reich.	Dog Violet	59	
V. cucullata Ait.	Stemless Blue Violet	59	
V. pallens (Banks.) Brain	White Violet	59	
V. pubescens Ait.	Downy Yellow Violet	59	
V. septentrionalis Greene.	Northern Blue Violet	6	
NYSSACEAE	SOUR GUM FAMILY		
Nyssa sylvatica Marsh.*	Tupelo	6	
ONAGRACEAE	EVENING-PRIMROSE FAMILY		
Circaea quadrisulcata (Maxim.) Franch. & Sav.	Enchanter's Nightshade	6	14
ARALIACEAE	GINSENG FAMILY		
Aralia nudicaulis L.	Wild Sarsparilla	6	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ADIACEAE	CARROT FAMILY		
Sanicula marlandica L.	Black Snakeroot	6	
Osmorhiza claytoni (Michx.) Clarke	Sweet Cicely	6	55
Cicuta maculata L.	Spotted Water-hemlock	6	
Daucus carota L.	Wild Carrot	6	14
CORNACEAE	DOGWOOD FAMILY		
Cornus alternifolia L. fil.	Alternate-leaved Dogwood	59	5,39
C. *florida* L.	Flowering Dogwood	5,38	5,38
C. *obliqua* Raf.	Silky Dogwood	6	
C. *racemosa* Lam.	Gray Dogwood	59,6	
C. *stolonifera* Michx.	Red Osier	6	54
PYROLACEAE	WINTERGREEN FAMILY		
Monotropa hypopithys L.	Pinesap	6	
ERICACEAE	HEATH FAMILY		
Gaultheria procumbens L.	Wintergreen	6	
Vaccinium corymbosum L.	Highbush Blueberry	6	
PRIMULACEAE	PRIMROSE FAMILY		
Lysimachia ciliata L.	Fringed Loosestrife	6	
Trientalis borealis Raf.	Star-flower	6	
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash	2,9, 38,5, 6	14,5,38, 40,41,39, 29
F. *nigra* Marsh.	Black Ash	6	
F. *pennsylvanica* Marsh.	Red Ash	38,5, 6	5,38,40, 41,39,54

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ASCLEPIADACFAE	MILKWEED FAMILY		
Asclepias syriaca L.	Common Milkweed	6	14
CONVOLVULACEAE	MORNING-GLORY FAMILY		
Convolvulus arvensis L.	Field Bindweed	1	
BORAGINACEAE	BORAGE FAMILY		
Myosotis laxa Lehm.	Forget-me-not	6	
Echium vulgare L.	Viper's Bugloss		6
VERBENIACEAE	VERVAIN FAMILY		
Verbena hastata L.	Blue Vervain	6	
LAMIACEAE	MINT FAMILY		
Glechoma hederacea L.	Ground Ivy	6	
Lycopus americanus Muhl.	American Water-horehound	6	
Prunella vulgaris L.	Heal-all	6	
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum dulcamara L.	Climbing Nightshade	6	
SCROPHULARIACEAE	FIGWORT FAMILY		
Verbascum thapsus L.	Common Mullein		6,14
Linaria vulgaris Mill.	Yellow Toadflax		6
ORBANCHACEAE	BROOM-RAPE FAMILY		
Epifagus virginiana (L.) Bart.	Beech-drops	6,59	14
PHRYMACEAE	LOPSEED FAMILY		
Phryma leptostachya L.	Lopseed	6	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
PLANTAGINACEAE	PLANTAIN FAMILY		
Plantago major L.	Broad-leaved Plantain		14
RUBIACEAE	MADDER FAMILY		
Cephalanthus occidentalis L.	Buttonbush	38,5, 6	56,5,38, 28,7,55, 54
Mitchella repens L.	Partridge-berry	6,59	
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Sambucus canadensis L.	Common Elder	6	
Viburnum acerifolium L.	Maple-leaved Viburnum	6	55
V. rafinesquianum Schult.	Downy Arrow-wood	6	55
V. recognitum Fern. *	Southern Arrow-wood	6	
Lonicera dioica L.	Glaucous Honeysuckle	6	
DIPSACACEAE	TEASEL FAMILY		
Dipsacus fullonum L.	Teasel		14
CAMPANULACEAE	HAREBELL FAMILY		
Lobelia cardinalis L.	Cardinal-flower		7

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ASTERACEAE	ASTER FAMILY		
Eupatorium perfoliatum L.	Boneset	6	
Solidago caesia x S. canadensis L. *	Hybrid Goldenrod	6	
S. canadensis L.	Canada Goldenrod	6	14
S. nemoralis Ait.	Gray Goldenrod	6	
S. rugosa Ait.	Rough Goldenrod	6	
Euthamia graminifolia (L.) Nutt.	Fragrant Goldenrod	6	
Aster cordifolius L.	Heart-leaved Aster	6	
A. novae-angliae L.	New England Aster	6	6,14
A. pilosus Willd. *	Spray Aster	6	14
A. simplex Willd.	Panicled Aster	6	
Ambrosia artemisiifolia L.	Common Ragweed		14
Bidens cernua L.	Nodding Beggar-ticks	6	
B. connata Muhl.	Devil's Beggar-ticks	6	
Arctium minus (Hill.) Bernh.	Common Burdock	6	
Taraxacum officinale Weber	Dandelion		1,6,14
Sonchus arvensis L.	Perrenial Sow-thistle	6	
Lactuca canadensis L.	Canada Lettuce	6	
Prenanthes alba L.	White Lettuce	6	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	OCCURRENCE AND SOURCES VICINITY
BRYOPHYTES			
FISSIDENTACEAE			
Fissidens taxifolius Hedw.			14
LEUCOBRYACEAE			
Leucobryum glaucum (Hedw.) Angstr. ex Fr.		6	
CLIMACIACEAE			
Climacium dendroides (Hedw.) Web. & Mohr		6	
POLYTRICHACEAE			
Atrichum angustatum (Brid.) B.S.G.		6	

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE LF-1E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
American Bittern	*Botaurus lentiginosus*		16,15,17
Great Blue Heron	*Ardea herodias*	26,22	15,16,19, 17,41
Green-backed Heron	*Butorides striatus*	38	15,16,38 29,53,26
Black-crowned Night-Heron	*Nycticorax nycticorax*		7,26,34
Tundra Swan	*Cygnus columbianus*		19
Canada Goose	*Branta canadensis*	57,27, 6	19,20,15
Wood Duck	*Aix sponsa*		7,26,28, 34,15
American Black Duck	*Anas rubripes*		16,26
Mallard	*Anas platyrhynchos*		15,16,26, 28
Blue-winged Teal	*Anas discors*		16,26,15
Hooded Merganser	*Lophodytes cucullatus*		26
Turkey Vulture	*Cathartes aura*		15,22,26 17
Northern Harrier	*Circus cyaneus*	6,1	15,17
Sharp-shinned Hawk	*Accipiter striatus*		16
Red-shouldered Hawk	*Buteo lineatus* *		26
Red-tailed Hawk	*Buteo jamaicensis*	19,38, 52,59	15,16,38, 26,30,41
American Kestrel	*Falco sparverius*		15,16
Ring-necked Pheasant	*Phasianus colchicus*	46	15,16,13, 46
Ruffed Grouse	*Bonasa umbellus*	38,59	15,16,38, 40,41,42
Northern Bobwhite	*Colinus virginianus* *		17,25
Virginia Rail	*Rallus limicola*		
Sora	*Porzana carolina*		16,17,7
Common Moorhen	*Gallinula chloropus*		15
Killdeer	*Charadrius vociferus*	6,38 59	15,16,38,
Lesser Yellowlegs	*Tringa flavipes*		16
Solitary Sandpiper	*Tringa solitaria*		16
Spotted Sandpiper	*Actitis macularia*		15,16
Upland Sandpiper	*Bartramia longicauda*		15
Common Snipe	*Gallinago gallinago*		15
American Woodcock	*Scolopax minor*		16

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Ring-billed Gull	*Larus delawarensis*		15,16
Herring Gull	*Larus argentatus*		16
Caspian Tern	*Sterna caspia*		15
Common Tern	*Sterna hirundo*		15,16,17
Rock Dove	*Columba livia*		15
Mourning Dove	*Zenaida macroura*	6,27	15,16
Black-billed Cuckoo	*Coccyzus erythrophthalmus*		15
Yellow-billed Cuckoo	*Coccyzus americanus*		15,17
Eastern Screech-Owl	*Otus asio*		15,17
Great Horned Owl	*Bubo virginianus*	57,6 59	15,26,29,30
Long-eared Owl	*Asio otus*		26
Short-eared Owl	*Asio flammeus*		16
Common Nighthawk	*Chordeiles minor*		15
Chimney Swift	*Chaetura pelagica*		15
Ruby-throated Hummingbird	*Archilochus colubris*		15,16,42,29,30
Belted Kingfisher	*Ceryle alcyon*		15,16,26
Red-headed Woodpecker	*Melanerpes erythrocephalus*	59	15,16,29
Downy Woodpecker	*Picoides pubescens*	43,59,1	15,16,40
Hairy Woodpecker	*Picoides villosus*	6	15,16
Northern Flicker	*Colaptes auratus*	6	15,16,30
Pileated Woodpecker	*Dryocopus pileatus*	6	
Eastern Wood-Pewee	*Contopus virens*	6	15,16
Alder Flycatcher	*Empidonax alnorum*		17,25
Willow Flycatcher	*Empidonax traillii*		15
Eastern Phoebe	*Sayornis phoebe*		16,15
Great Crested Flycatcher	*Myiarchus crinitus*		15,16
Eastern Kingbird	*Tyrannus tyrannus*		15,16
Horned Lark	*Eremophila alpestris*		15,16
Purple Martin	*Progne subis*	45	15,16,30
Tree Swallow	*Tachycineta bicolor*	6	15,16
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		16,15
Bank Swallow	*Riparia riparia*		16,15
Barn Swallow	*Hirundo rustica*		15,16
Blue Jay	*Cyanocitta cristata*	52,44,1,6,45	15,16,40
American Crow	*Corvus brachyrhynchos*	6	15,16

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Black-capped Chickadee	*Parus atricapillus*	6,43, 1	15,16
Tufted Titmouse	*Parus bicolor* *		53,17
White-breasted Nuthatch	*Sitta carolinensis*	6	15,16
House Wren	*Troglodytes aedon*		15
Marsh Wren	*Cistothorus palustris*		17,25
Golden-crowned Kinglet	*Regulus satrapa*		16
Veery	*Catharus fuscescens*		16,15
Wood Thrush	*Hylocichla mustelina*		16
American Robin	*Turdus migratorius*	1,6	15,16,21
Gray Catbird	*Dumetella carolinensis*	6	15,16
Northern Mockingbird	*Mimus polyglottos*		17,15
Brown Thrasher	*Toxostoma rufum*		15,16
Cedar Waxwing	*Bombycilla cedrorum*	1,6	15,16
Northern Shrike	*Lanius excubitor*		57
European Starling	*Sturnus vulgaris*	6	15,16
Yellow-throated Vireo	*Vireo flavifrons*		17,15,25
Warbling Vireo	*Vireo gilvus*		15
Red-eyed Vireo	*Vireo olivaceus*		15,16
Nashville Warbler	*Vermivora ruficapilla*		16
Yellow Warbler	*Dendroica petechia*		15,16,42
Chestnut-sided Warbler	*Dendroica pensylvanica*		16
Magnolia Warbler	*Dendroica magnolia*		16
Cape May Warbler	*Dendroica tigrina*		16
Black-throated Blue Warbler	*Dendroica caerulescens*		16
Yellow-rumped Warbler	*Dendroica coronata*		16
Black-throated Green Warbler	*Dendroica virens*		16
Blackburnian Warbler	*Dendroica fusca*		16
Bay-breasted Warbler	*Dendroica castanea*		16
Blackpoll Warbler	*Dendroica striata*		16
Black-and-white Warbler	*Mniotilta varia*		16
American Redstart	*Setophaga ruticilla*		15

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Ovenbird	*Seiurus aurocapillus*		17
Common Yellowthroat	*Geothlypis trichas*	6	15
Scarlet Tanager	*Piranga olivacea*		15
Northern Cardinal	*Cardinalis cardinalis*	45	15,16,18 22,27,41, 30
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	59	15,16,40
Indigo Bunting	*Passerina cyanea*		15
Rufous-sided Towhee	*Pipilo erythrophthalmus*		15,16
American Tree Sparrow	*Spizella arborea*	6	16
Chipping Sparrow	*Spizella passerina*		15,16
Field Sparrow	*Spizella pusilla*		15,16
Vesper Sparrow	*Pooecetes gramineus*		15
Savannah Sparrow	*Passerculus sandwichensis*		15
Grasshopper Sparrow	*Ammodramus savannarum*		15,17
Song Sparrow	*Melospiza melodia*		15,16
White-throated Sparrow	*Zonotrichia albicollis*		15
White-crowned Sparrow	*Zonotrichia leucophrys*		16
Dark-eyed Junco	*Junco hyemalis*		16
Bobolink	*Dolichonyx oryzivorus*		15,42
Red-winged Blackbird	*Agelaius phoeniceus*	1,38, 59	15,16,38, 41,40,42, 43
Eastern Meadowlark	*Sturnella magna*		15,16
Common Grackle	*Quiscalus quiscula*	6	15,16
Brown-headed Cowbird	*Molothrus ater*	52	15,16
Northern Oriole	*Icterus galbula*		15,16,42, 20
Common Redpoll	*Carduelis flammea*		16

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
American Goldfinch	*Carduelis tristis*	6,38	15,16,21, 30,38
Evening Grosbeak	*Coccothraustes vespertinus*		16
House Sparrow	*Passer domesticus*	52	15,16

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE LF-1E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Opossum	*Didelphis virginiana* *	22,57 18,27, 19,59	20,29,30, 35
Masked Shrew	*Sorex cinereus*		16
Short-tailed Shrew	*Blarina brevicauda*		16
Hairy-tailed Mole	*Parascalops breweri*		16
Star-nosed Mole	*Condylura cristata*		16
Eastern Cottontail	*Sylvilagus floridanus*	21,18, 47,48, 22,59	20,21,16, 35,42
Eastern Chipmunk	*Tamias striatus*		16,12
Woodchuck	*Marmota monax*	18	16,42,10
Grey Squirrel	*Sciurus carolinensis*		16,29,30, 42
American Red Squirrel	*Tamiasciurus hudsonicus*		16,30,35
Deer Mouse	*Peromyscus maniculatus*		16
White-footed Mouse	*Peromyscus leucopus*		16
Muskrat	*Ondatra zibethicus*	4,59	36,4,7,16 10,42,
Meadow Vole	*Microtus pennsylvanicus*		16
Meadow Jumping Mouse	*Zapus hudsonius*		16
Coyote	*Canis latrans*	57,24 59	13,36
Wolf	*Canis lupus*	43	
Red Fox	*Vulpes vulpes*	33,57, 48,47, 24,43 44,27, 59	20,13,23, 29,16,12, 51,30,36
Grey Fox	*Urocyon cinereoargenteus* *		16
Raccoon	*Procyon lotor*	57,4,6, 22,33, 24,59	29,4,7, 35,36,16, 30
Long-tailed Weasel	*Mustela frenata*		16,29
American Mink	*Mustela vison*	59	7,16,29 42
American Badger	*Taxidea taxus* *	22	

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE LF-1E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Striped Skunk	*Mephitis mephitis*	6,59	35
White-tailed Deer	*Odocoileus virginianus*	27,6, 48,47, 44,43 46,18, 19,22, 38,52, 59	49,50,51, 38,20,13, 16,41,11, 29,30

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE LF-1E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Eastern American Toad	*Bufo a. americanus*	6,43 59,1	
Bullfrog	*Rana catesbeiana*		7
Green Frog	*Rana clamitans*	6	
Northern Leopard Frog	*Rana pipiens*	6	
Wood Frog	*Rana sylvatica*	6	
Common Snapping Turtle	*Chelydra s. serpentina*	57	57
Midland Painted Turtle	*Chrysemys picta marginata*	57	57
Blanding's Turtle	*Emydoidea blandingii* *		57
Eastern Garter Snake	*Thamnophis s. sirtalis*	6,59	

* Denotes that the species is considered to be rare based upon recognized literature sources (see Section 4.4 and 5.5).

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE LF-1E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Central Mudminnow	*Umbra limi*		16
Northern Pike	*Esox lucius*	27,31, 46	13,31,16, 9,37,10, 46
Goldfish	*Carassius auratus*		32,10
Carp	*Cyprinus carpio*		16
Golden Shiner	*Notemigonus crysoleucas*		16
Emerald Shiner	*Notropis atherinoides*		16
Spottail Shiner	*Notropis hudsonius*		32,16,
Bluntnose Minnow	*Pimephales notatus*		2,16,32,
Creek Chub	*Semotilus atromaculatus*		16
White Sucker	*Catostomus commersoni*		16
Brown Bullhead	*Ictalurus nebulosus*		16
Tadpole Madtom	*Noturus gyrinus*		16
Rock Bass	*Ambloplites rupestris*		22,32,16,
Pumpkinseed	*Lepomis gibbosus*		16
Largemouth Bass	*Micropterus salmoides*	31	31
Black Crappie	*Pomoxis nigromaculatus*		16
Yellow Perch	*Perca flavescens*		22,16

DATA SOURCES FOR TABLES 5-9

1. Gartner Lee Associates Limited, 1984a.
2. Ontario Ministry of Natural Resources, 1979a.
3. Meyers, 1984.
4. Ontario Ministry of Natural Resources, 1984g.
5. Brady *et al*., 1980a.
6. Gartner Lee Associates Limited, 1984b.
7. Ontario Ministry of Natural Resources, 1984e.
8. Ontario Ministry of Natural Resources, 1984h.
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10. Biggar, 1984.
11. Majoros, 1984.
12. Lundy, 1984.
13. Merritt and Merritt, 1984.
14. Gartner Lee Associates Limited, 1984c.
15. Ontario Breeding Bird Atlas, 1984.
16. Acres Consulting Services Limited, 1978.
17. Knapton and Foley, 1984.
18. Cowan, 1984.
19. Terreberry, 1984.
20. Pietrangelo, Ms. D., 1984.

DATA SOURCES FOR TABLES 5-9 (cont'd)

21. Sider, 1984.
22. McCracken, 1984.
23. Pietrangelo, Mr. D., 1984.
24. Chambers, R., 1984.
25. Knapton, 1984.
26. Folemsbee, undated.
27. Warner, A., 1984.
28. Department of the Environment, 1972a.
29. Morris, G., 1984.
30. Morris, J., 1984.
31. Ontario Ministry of Natural Resources, 1984c.
32. Ontario Ministry of Natural Resources, 1976.
33. Ontario Ministry of Natural Resources, 1984b.
34. Philips Planning and Engineering Limited, 1972.
35. Munderich, 1984.
36. Stead, 1984.
37. Ontario Ministry of Natural Resources, 1984d.
38. Brady _et al_., 1980b.
39. Brady _et al_., 1980c.
40. Brady _et al_., 1980d.

DATA SOURCES FOR TABLES 5-9 (cont'd)

41. Brady *et al.*, 1980e.
42. Wade, 1984.
43. Warner, D., 1984.
44. Fekete, 1984.
45. Rogers, 1984.
46. VanLeur, 1984.
47. Kretz, 1984.
48. Mamczycz, 1984.
49. Poirier, 1984.
50. Savoie, 1984.
51. Chambers, T., 1984.
52. Gartner Lee Associates Limited, 1984d.
53. Coville, 1984.
54. Macdonald, 1980.
55. Macdonald and Smith, 1973.
56. Department of the Environment, 1972b.
57. Coville and DeBoer, 1984.
58. Silverthorn, 1984.
59. Regional Municipality of Niagara Ecological and Environmental Advisory Committee, 1984.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site LF-1E from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 10. Interview numbers are related to identifications assigned by Ecologistics Ltd. during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview form are contained in Table 11. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

During conversations with landowners regarding permission to conduct field work on their properties, we followed up on questions which arose from a review of "Walk-and-Talk" interview data. Table 12 is an example of a completed "Public Contact - Local Data Collection" form which records such a follow up conversation.

Completed "Public Contact - Local Data Collection" forms are on file at Gartner Lee Associates Limited. Table 13 is a summary of information arising from these follow up contacts.

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mrs. Bruce Silverthorn	14-2-53 14-2-17 14-2-10 14-2-50	LF-1E (S) LF-1E (SV)	245-2	- fuelwood - harvest wild strawberries and maple syrup
Mr. Archie Warner	14-2-55 14-2-87 14-2-119 14-2-115	LF-1E (S) LF-1E (SV)	25-2	- foxes throughout - opossums in barn - pike use to be in stream - mourning doves, cardinals - ducks nest in woodlot on 14-2-87 - harvest wild strawberries
Mr. & Mrs. Thomas Cowan	14-2-18	LF-1E (S)	17-2	- deer run through property - opossum in area - fuelwood from woodlot - harvest strawberries, raspberries, mushrooms, puff balls, leeks - hunt rabbits
Mr. B. McCracken and Mr. & Mrs. L. McCracken	14-2-14-1	LF-1E (S)	77-1a	- badgers, opossums, deer, rabbits, raccoons - owls, blue cranes, hawks - fuelwood from woodlot around house

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Ms. Mildred Terreberry	14-2-21	LF-1E (S)	79-1	- deer, opossum - harvest vegetables and wild fruit - fish spawn in stream
Mr. Wilson Silverthorn	14-2-52	LF-1E (S)	IER #2	- none
Mr. David Underhill	14-2-60-1	LF-1E (S)	116-2	- fuelwood from woodlot
Mr. David Warner	14-2-20 14-2-12 4-1-198 4-1-171-2	LF-1E (S) LF-1E (SV)	42-2	- fox, deer, wolf
Mr. Joseph Fekete	14-2-60	LF-1E (S)	117-2	- fox, deer - blue jays, hawks - harvest wild strawberries
Mr. & Mrs. James Rogers	14-2-22	LF-1E (S)	85-1	- purple martin colony - cardinals, blue jays in winter

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Bob Tishler	14-2-64	LF-1E (S)	24-1	- none
Mr. Istvan Kovacs	14-2-63 14-2-65	LF-1E (S)	113-1a	- none
Mr. Nicola Giammarco	14-2-19	LF-1E (S)	10-2	- none
Mr. & Mrs. J. Van Leur	14-2-15	LF-1E (S)	73-2	- pike in stream - harvest wild strawberries
	14-1-183	LF-1E (SV)		
Mr. Walter Kretz	14-2-61	LF-1E (S)	9-2	- red foxes, deer, rabbits - hunt deer - harvest maple syrup, wild strawberries, elderberries and raspberries

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Ivan Mamczycz	14-2-23 14-2-23-1 14-2-19	LF-1E (S)	11-2	- deer, foxes, rabbits, in corner woodlot - harvest mushrooms, puff balls, strawberries - fuelwood from woodlot
Mr. Donald Mannell	14-2-123 14-2-83 14-2-84 14-2-94 14-2-97 14-2-91 14-2-95	LF-1E (SV)	147-2	- none
Mr. & Mrs. John Taylor	14-2-67	LF-1E (S)	111-1	- none
Mr. & Mrs. George Watson	14-2-59	LF-1E (S)	64-1	- raise crayfish in ponds
Mr. Ernest Damore	14-2-57	LF-1E (S)	28-1	- none
Mrs. Augustine Secco	14-2-177-1	LF-1E (S)	20-1	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. V. Mamchych	14-2-14	LF-1E (S)	3-1	- none
Mrs. Rosina Perrotta	14-2-8	LF-1E (SV)	509-G	- none
Mr. & Mrs. J. Morris	14-2-50	LF-1E (SV)	71-2	- deer, red fox, opossum, and other mammals - several bird species - sawlogs and fuelwood from woodlot
Mr. Paul Evans	14-1-185	LF-1E (SV)	533-G	- harvests vegetables from garden
Mr. Raffaele Butera	14-2-68	LF-1E (SV)	120-2	- none
Mr. A. Del Vecchio	14-2-93	LF-1E (SV)	267-1	- none
Mr. & Mrs. Roy Vogt	14-2-99	LF-1E (SV)	426	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. B. Warner	14-2-12	LF-1E (SV)	30-2	- none
Mr. Carl Poirier	14-2-30	LF-1E (SV)	216-2	- deer
Mr. & Mrs. R.F. Course	14-1-184	LF-1E (SV)	106-1a	- harvests vegetables from garden
Mr. & Mrs. Walter Savoie	14-1-188-2	LF-1E (SV)	2-1	- deer
Mr. Ken Biggar	14-2-89 14-2-136	LF-1E (SV)	13-2	- pike and carp in stream - harvests pike
Mr. J. Majoros	14-2-69 14-2-35 14-2-70 4-1-253 4-1-112	LF-1E (SV)	29-2	- hunt deer in area - maple syrup from 14-2-70 - fuelwood and harvests wild mushrooms from woodlot

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Glen Lundy	14-1-173 14-1-173-1	LF-1E (SV)	677	- fuelwood from woodlot - hunt fox and rabbits - harvest wild strawberries, raspberries and elderberries
Mr. & Mrs. T. Chambers	14-2-25	LF-1E (SV)	4-1	- deer, foxes - fuelwood - harvests elderberries and mushrooms
Mr. W. Leishman	14-1-182	LF-1E (SV)	23-1a	- fuelwood - harvests strawberries and grapes
Mr. G.W. Morris	14-2-10-01 14-2-10	LF-1E (SV)	112-2	- deer, opossums, mink and other mammals - birds, reptiles - hunt deer - fuelwood and sawlogs - harvest maple syrup, and wild leeks and mushrooms

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. John Coville	14-2-46	LF-1E (SV)	715	- green heron - harvest elderberries and strawberries
Mr. & Mrs. Charles Warner	14-2-113 14-2-114	PI-27E (SV)	48-2	- harvest fuelwood and wild strawberries
Mr. & Mrs. J. Stirlings	14-2-125	PI-27E (SV)	101-1	- mudhens and other birds - fishing for Rock Bass and Perch in Chippawa Creek - vegetable garden
Mr. Charles Cook	14-2-122	PI-27E (S)	66-1	- blue heron
Mr. & Mrs. B. McGrath	14-2-120	PI-27E (S)	68-1	- groundhog, deer, rabbits, opossum - harvest trout from stream, and wild strawberries
Mr. J. Sider	13-4-16	PI-27E (SV)	211-1	- rabbits, bluebirds, and other birds - harvest wild berries

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. John Grassl	14-2-108	PI-27E (S)	183	- none
Mr. L. Fiorentino	13-4-14	PI-27E (SV)	41-2	- none
Mr. Tibor Palatine	13-4-5 13-4-144 13-4-149 13-4-150 13-4-147	PI-27E (SV)	284	- none
Mr. & Mrs. J. Merritt	14-2-126	PI-27E (SV)	109-1	- pheasants, ducks, coyote, deer, fox - harvest pike, strawberries, wild garlic

Interview Identification Number: ______

TABLE 11: BIOLOGY QUESTIONS LISTED ON WALK-AND-TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

TABLE 12: EXAMPLE OF A COMPLETED "PUBLIC CONTACT - LOCAL DATA COLLECTION" FORM

3.5 PUBLIC CONTACT - LOCAL DATA COLLECTION

No. 36

CANDIDATE SITE LF-1E

PROPERTY ROLL NUMBER(S) 14-2-14-1

LANDOWNER:
NAME Brian McCracken
ADDRESS *c/o Mr + Mrs Laurel McCracken 6411 Carlton Ave

TELEPHONE NUMBER * 358-5443 , 735 - 7652

LANDOWNER CONTACTED BY:
TELEPHONE ✓
MAIL
VISIT

DATE OF CONTACT:
21/09/84 CPH

ISSUE(S) TO DISCUSS:

Badger
where underneath car in driveway -
when 8 or 9 months ago
how many 1
doing what - challenged landowner when approached
den - don't know
Landowner fairly positive of identification.

(over)

REMARKS:

Possum

where - around barn on property
when - spring of 84
how many one on a few separate occasions
doing what - — wandering around
den - don't know

Blue Crane (Heron)

where pond between house + barn on property

SKETCH MAP:

when spring
how many one on at least two occasions
nest - no

TABLE 13: SUMMARY OF FOLLOW-UP INTERVIEW DATA FOR SITE LF-1E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	BIOLOGY COMMENTS
Mrs. Mildred Terreberry	14-2-21	LF-1E (S)	- discussed observation of "possum": one seen in backyard taking food from feeder
Mrs. Silverthorn	14-2-53(S) 14-2-17(S) 14-2-10(SV) 14-2-50(SV)	LF-1E (S & SV)	- discussed Pin Oak record - no additional detail (eg. location) available
Mrs. Cowan	14-2-18	LF-1E (S)	- discussed "possum" observations: usually one seen through fall and winter - landowner feeds it table scraps
Mr. Brian McCracken	14-2-14-1	LF-1E (S)	- discussed Badger observation: seen under landowners car in winter: den-site unknown - discussed "possum" - seen around barn on property: other detail unknown - discussed "Blue Crane": seen in pond between house and barn: no nest known

9.0 BIOLOGY SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale. Completed data forms and station location maps are in working files at GLAL.

Table 14 is an example of a completed field data form. It is for station 17 on Site LF-1E.

TABLE 14: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - LF-1E

FIELD INVESTIGATIONS | STATION 17 ROLL 3 PHOTO(S) 12

VEGETATION

VEGETATION ASSOCIATION 4 FRI DOMINANTS Ms8 Aw2

Strata	% Cover	Plot Size	Dominant Species - Sample Collected (c)
Tree Species >6m	50	5	Acer rubrum Nyssa sylvatica Carya ovata
Tree Species <6m	5	5	Carpinus caroliniana Ulmus americana
Shrub Species >1.5 m	5	5	Vaccinium corymbosum
Shrub Species <1.5 m	/	5	
Graminoid/Herb Species	<5	2	Lycopus americana
Moss/Lichen Species	/	2	

Snags/Hectare ______

Average Canopy Height: FRI 17m, Field ______ Surface Wetness ______ Vegetation Mapping Change ______

Comments / Rare Or Uncommon Species:

presence of Nyssa sylvatica see notes below

WILDLIFE

Raccoon (t)

White-tailed Deer (s)

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type dp Average Width ______ Average Depth 6cm Permanence pi Turbidity cl

Approximate Area 25m²

Shoreline Conditions organic Bottom Conditions organic

Fish And Invertebrate Species Observed:

Submergent, Emergent Plant Species: none

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

swale seasonally larger; no doubt

Nyssa sylvatica:

3 specimens >6m tall: avg dbh 18cm

2 specimens <6m tall: avg dbh 2cm

saplings almost completely dead

- 2 trees cut recently 20 m NW of station

10.0 OWMC PHASE 4A - BIOLOGY FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2 SEPTEMBER, 1984

Gartner Lee Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ■ Markham,Ontario ■ L3P 3J9 ■ 416-477-8400
Telex-06-986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m^2. The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m^2 gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m^2. Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.1 SITE ACCESS PERMISSION FORM

No. ________

CANDIDATE SITE ____________________

PROPERTY ROLL NUMBER(S) ____________________

____

LANDOWNER:

NAME ____________________

ADDRESS ____________________

TELEPHONE NUMBER ____________________

LANDOWNER CONTACTED BY:

TELEPHONE __________ DATE OF CONTACT:

MAIL __________ ____________________

VISIT __________

PERMISSION TO ENTER PROPERTY:

GRANTED __________

NOT GRANTED __________ REASON ____________________

PERMISSION TO COLLECT PLANT SAMPLES:

GRANTED __________

NOT GRANTED __________ REASON ____________________

COMMENTS: ____________________

____

____

____

____

Gartner
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Associates
Limited

3.2

FIELD OBSERVATION SHEET | BIOLOGICAL STATIONS : | **SITE**

Candidate Site: ____________

OWMC 84-S18.2

Gertner Lee Associates Limited

SITE

A) Background

Air Photos: ____________

Photographs Taken:

Roll: ________ **Photos:** ____________

Corresponding Maps:

____

____

Observer(s): ____________

Date Of Visit: ____________

Time & Duration ____________

Weather:

Present: ____________

Previous Day: ____________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ____________

____

____

Flora: ____________

____

____

Fauna: ____________

____

____

Comments: ____________

____

____

____

____

____

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

- Vegetation Association

Forest:	deciduous	D	Upland = u Lowland = l
	coniferous	C	
	mixed	M	
Thicket:	shrub	T	
Field:	crop land	C	
	recently abandoned	FR	
	old	FO	
	successional	FS	
Others:	marsh	M	
	industrial/residential/manicured	R	

Descriptors:

flooded	(F)
cutover and/or recent secondary succession	(C)
post-fire succession	(P)
grazed	(G)
drained	(D)
plantation	(Pl)

- Surface Wetness

dry	0
moist	1
wet	2

Wildlife

- Observation Code

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

- Type

stream	s
pond	p
diffuse ponding and swales	dp

- Permanence

possibly permanent	p
probably intermittent	pi
intermittent	i

- Turbidity

clear	c
cloudy	cl
turbid	t

- Shoreline Conditions

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

- Bottom Conditions

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

Page ___ of ___

SITE ____

FIELD INVESTIGATIONS

STATION ____ ROLL ____ PHOTO(S) ____

VEGETATION

VEGETATION ASSOCIATION ____ FRI DOMINANTS ____

Strata	% Cover	Plot Size	Dominant Species - Sample Collected: (c)
Tree Species >6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species <1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ____

Average Canopy Height: FRI ____, Field ____ Surface Wetness ____ Vegetation Mapping Change ____

Comments / Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____

Approximate Area ____

Shoreline Conditions ____ Bottom Conditions ____

Fish And Invertebrate Species Observed: ____

Submergent, Emergent Plant Species: ____

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

Page ____ of ____

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No.______

CANDIDATE SITE ____________________________________

PROPERTY ROLL NUMBER(S) ____________________________________

____

LANDOWNER:
NAME ____________________________________
ADDRESS ____________________________________

TELEPHONE NUMBER ____________________________________

LANDOWNER CONTACTED BY:
TELEPHONE __________
MAIL __________
VISIT __________

DATE OF CONTACT:
____

ISSUE(S) TO DISCUSS:

____

____

____

____

____

____

____

REMARKS:

SKETCH MAP:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees.

CONIFEROUS: forest is composed of 80% or more coniferous trees.

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include Crataegus sp., Cornus racemosa and Spirea alba.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).
Others:
WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including *Typha angustifolia* and *Scirpus atrovirens*. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

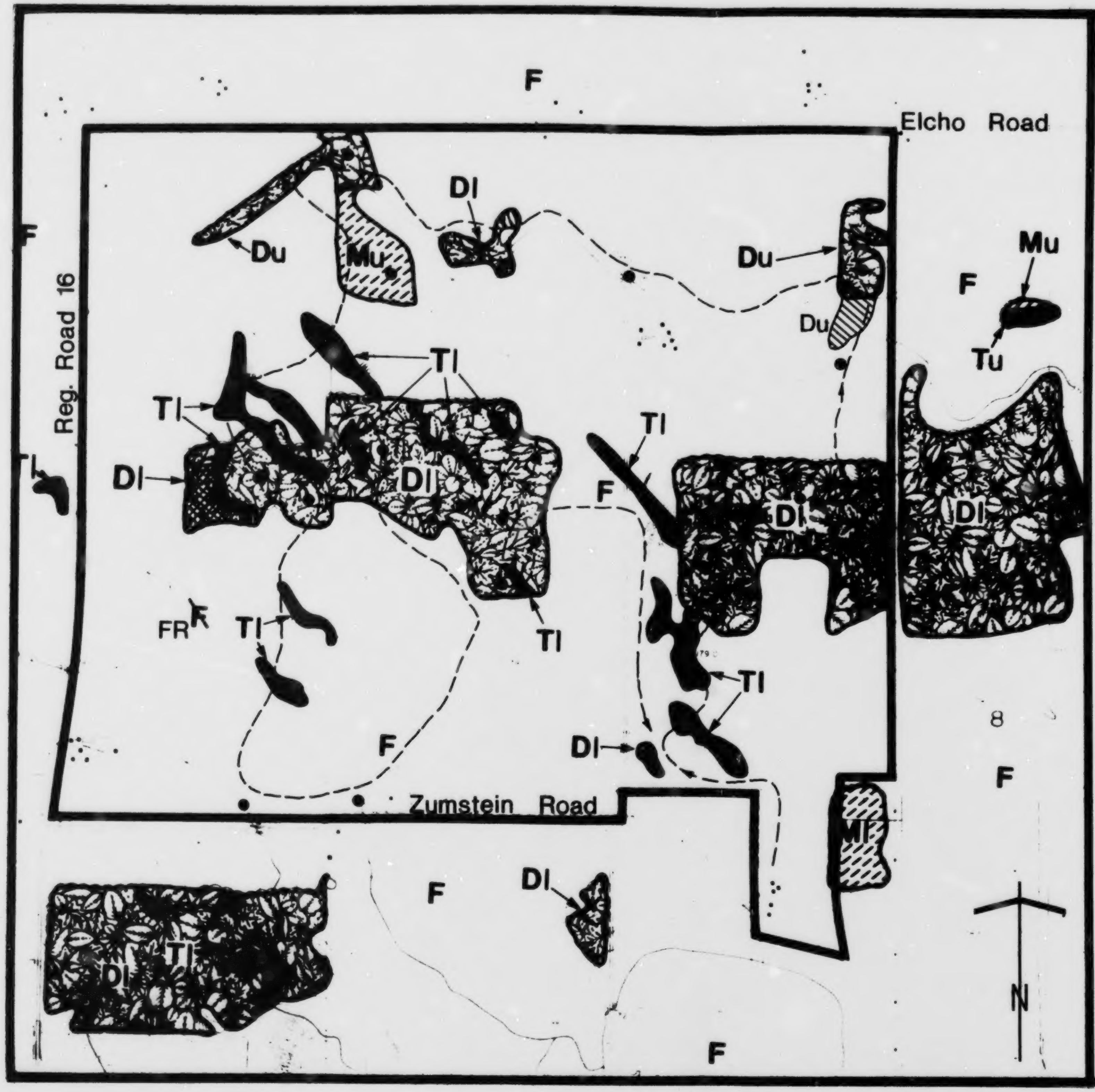
MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

County	Township	Lot—Con.	Location	Date	Collector	No.	Habitat and Notes

Herbarium / Reseacher / Date

Limited


F
Elcho Road
Reg. Road 16
Zumstein Road
Dl
Du
Mu
Du
Du
F
Mu
Tu
Tl
Tl
Dl
Dl
Dl
Tl
F
Dl
FR
Tl
Tl
Tl
F
Dl
8
F
Ml
F
Dl
F
Dl
Tl
F
N

3·6

Field Map 1
Vegetation Mapping
LF-3C-01

Legend

● Proposed Sample Points

- - Proposed Fieldwork Transect

Changes In Mapping

▨ Add Habitat

▩ Delete Habitat

FR Changed Designation

D	Deciduous	Vegetation Cover Types
C	Coniferous	
M	Mixed	
F	Field (cultivated or pasture)	
H	Hedgerow (major)	
■	Thicket	
l	Lowland	Cover Type Descriptors
u	Upland	
6.2	Significant Environmental Unit (SEU)	

Scale 1:10,000

Gartner Lee Associates Limited

3·7

Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥ Field Observation Station (example)

P6 → Photograph And Direction Taken

– – Transect Followed In Field

MAP NOTES

Scale 1:10,000

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Number/
Numéro

4

SITE SELECTION PROCESS PHASE 4A:

TECHNICAL APPENDIX LF-2N -

EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee
Associates Limited

Gartner Lee Associates Limited

Consulting Engineering
Geologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex-06-986278

September 18, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix LF-2N - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site LF-2N.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly

GARTNER LEE ASSOCIATES LIMITED

for E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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BIOLOGICAL RESOURCES
STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr. - Associate and Senior Biologist of GLAL - Report Review

Kenneth Dance, M.Sc. - Associate and Senior Biologist of GLAL - Report Writing and Project Management

Thomas Hilditch, B.Sc.,Agr. - Biologist of GLAL - Data Collection

Donald Fraser, M.Sc. - Biologist of GLAL - Site Report Preparation

Wayne Weller, M.Sc. - Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site LF-2N and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Four natural vegetation cover types occur on the site, including examples of both recently disturbed field and old field. No special vegetation associations are present.

A total of 41 plant species are known from Site LF-2N, of which none is rare. Wildlife related data indicate the presence of 24 bird species, and four mammals. None is considered rare.

No forestry, trapping or fishing activity has been reported from the site.

No Significant Environmental Units or fish and wildlife features of significance occur in the LF-2N site vicinity.

One rare fish species has been recorded in the site vicinity.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Biology".

The bulk of the existing biological information for Site LF-2N is summarized on two maps and in ten tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

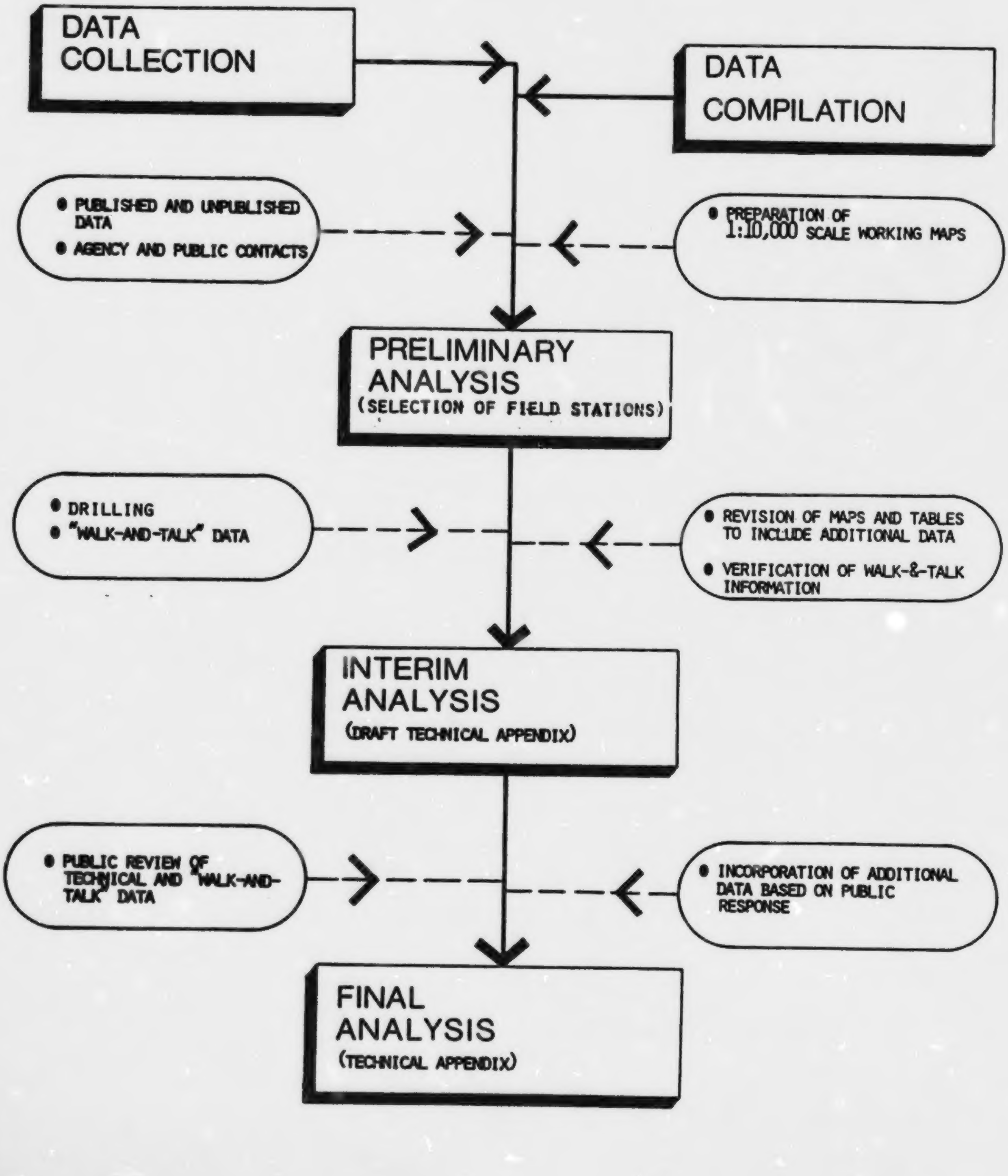
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
• PUBLISHED AND UNPUBLISHED DATA
• AGENCY AND PUBLIC CONTACTS
• PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS (SELECTION OF FIELD STATIONS)
• DRILLING
• "WALK-AND-TALK" DATA
• REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
• VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS (DRAFT TECHNICAL APPENDIX)
• PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
• INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS (TECHNICAL APPENDIX)

Government reports on vegetation, and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Credit Valley Conservation Authority, the City of Mississauga, the Regional Municipality of Peel, and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site LF-2N are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984d), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

Where important features were known prior to field work, efforts were made to check these.

Reconnaissance field studies on Site LF-2N were conducted on September 26, 1984. Other visits to the site by GLAL biologists occurred on May 15 and 18, June 25, July 19, September 27 and November 6, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site LF-2N citizens group on July 26, 1984.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and "non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 9. These lists should be considered preliminary and may be incomplete.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the LF-2N site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Halton, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete

evidence such as a photograph and/or specimen, and the potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 9 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences which were discounted during the noteworthy species evaluation were not dealt with further. Reports of nesting by the following 16 species of birds (Omagh United Taxpayers 1984a, 1984b) were considered erroneous in light of the known breeding distributions and/or habitat requirements of these taxa.

For example, reports of Wolves (Canis lupus) on Site LF-2N are considered erroneous, as this species is often confused with its close relative, the Coyote (Canis latrans). The Wolf was extirpated from much of southern Ontario prior to 1900 (Campbell and Dagg, 1972).

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to faunal species which utilize Site LF-2N and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was also not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

This technical appendix represents the interpretation of biological features and biological resource use at Site LF-2N to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

3.0 SETTING

3.1 REGIONAL SETTING

Site LF-2N is located in the Regional Municipality of Peel. Its position relative to the other seven OWMC candidate sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within acquisition boundaries as portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It is 172 ha in size and includes Lots 9 and 10, Concession 1, E.H.S. in the City of Mississauga, Regional Municipality of Peel. It is bounded on the north by Derry Road (Regional Road 5), on the east by First Line Road and on the west by Hurontario Street (Highway 10). The southern boundary is the southernmost limit of Lot 9.

The site is located within the corporate limits of the City of Mississauga (northeast corner) and is approximately 7.0 km southeast of downtown Brampton and about 9.0 km west of Metropolitan Toronto's western limit. Small communities in the immediate vicinity include Derry West, adjacent to the northwest corner of the site, Meadowvale Village, approximately 3.0 km to the southwest, Mount Charles, approximately 3.0 km to the northeast and Brittania, approximately 2.0 km to the southeast. The Credit River is approximately 3.0 km southwest of the site, and Fletchers Creek, a tributary of the Credit, is situated approximately 500 m to the southwest. Access from the south is via Highway 401 and Highway 10.

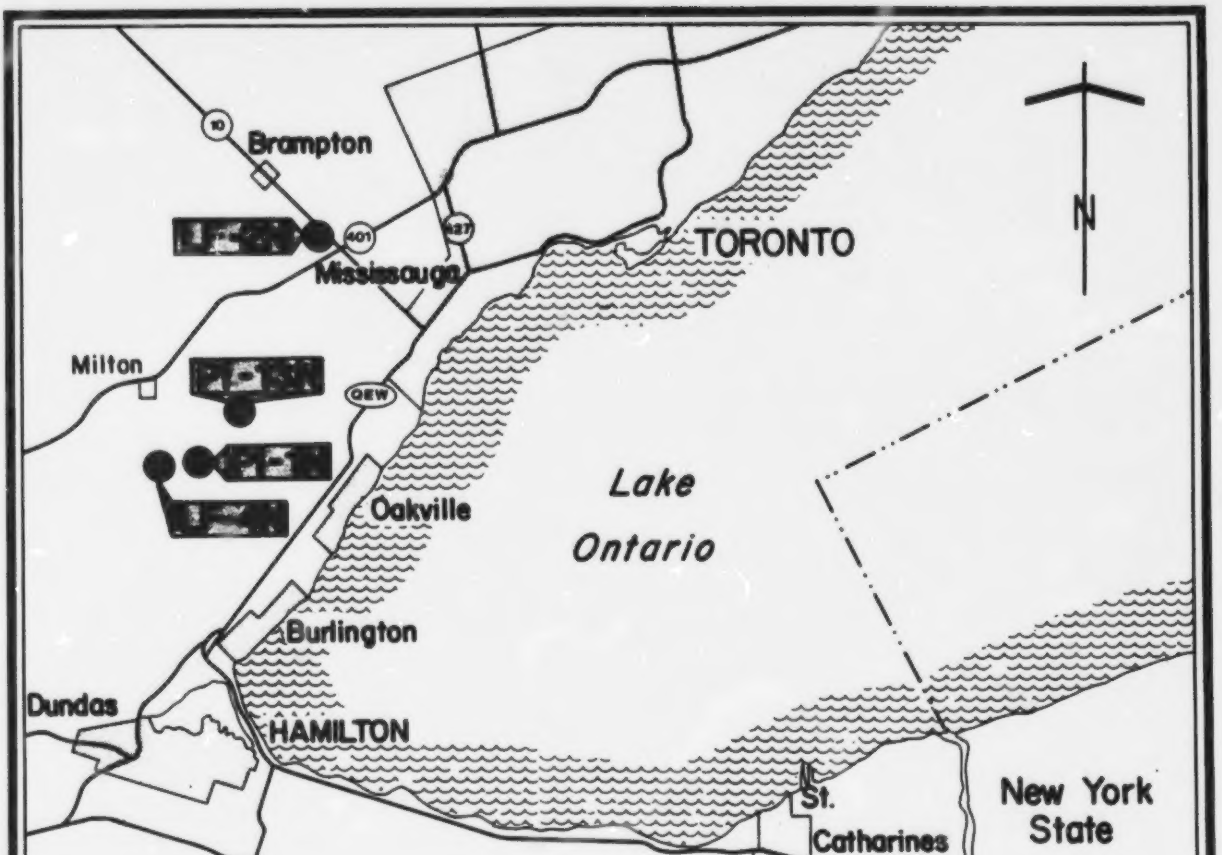
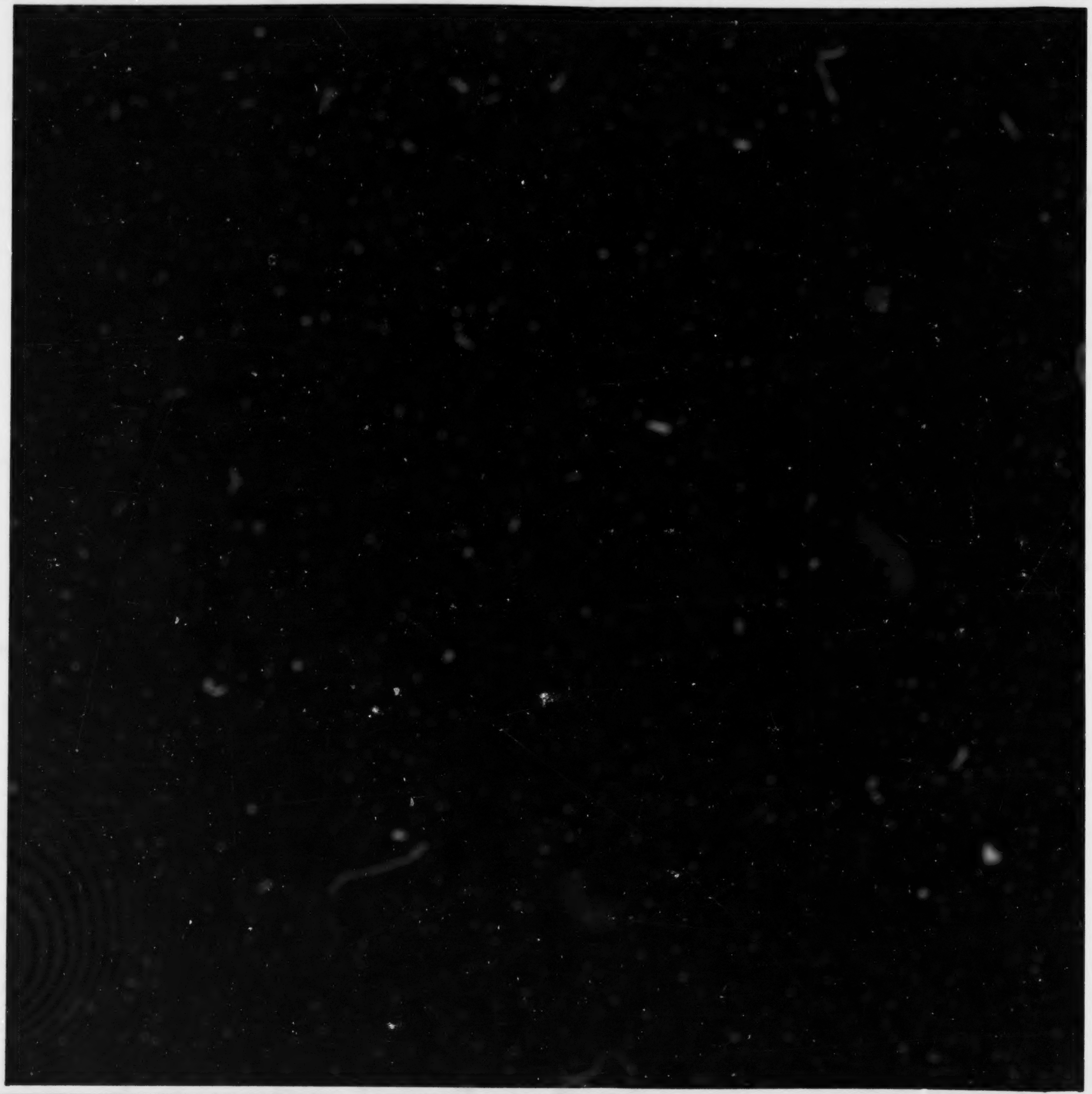

Brampton
10
401
427
Mississauga
TORONTO
N
Milton
QEW
Oakville
Lake
Ontario
Burlington
Dundas
HAMILTON
St.
Catharines
New York
State
Niagara
Falls
20
56
58
Caledonia
LF-9C
PI-27E
LF-1E
LF-3C
Welland
QEW
3
Dunnville
Wainfleet
Fort Erie
Port
Colborne
Lake Erie

FIGURE 2 LOCATION OF CANDIDATE SITES

Miles 8
0
8
16
Kilometres 10
0
10
20



OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

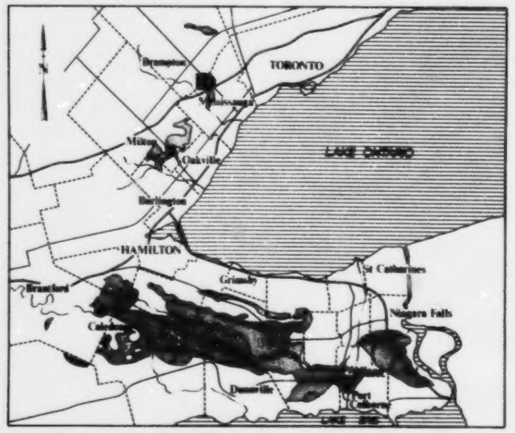
Legend:

Rare Species Location

ANIMALS PLANTS

▬ Phase 3B Acquisition Boundary

Key Map: LF - 2 North


N
Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
St Catharines
Grimsby
Brantford
Niagara Falls
Caledonia
Dunnville
Port Colborne

Scale Bar	500	0	500
	250	0	250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 Figure 3

4.0 EXISTING
BIOLOGICAL RESOURCES - SITE

Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

4.1 OVERVIEW OF SITE BIOLOGY

Small areas of upland thicket, recently disturbed field, old field and marsh are present on Site LF-2N. More than 90% of the site is currently in agricultural production.

Twenty-four bird species have been recorded within the acquisition area, 11 of which may utilize the area for nesting purposes. Four species of mammals have also been recorded from the site.

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated in Section 4.2.2.

4.2.1 SPECIES LIST:

A total of 41 plant species has been recorded on Site LF-2N. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Four natural vegetation associations are present on Site LF-2N. Cropland and unclassified land are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under three major cover type headings:

Thicket

Only one small pocket of upland thicket is found on-site and occupies less than one hectare. It is located in the east-central area of the site, and is dominated by Manchu Cherry (*Prunus tomentosa*).

This non-native taxon forms a dense shrub thicket with a canopy height of 3 m.

Marsh

One small pocket of marsh (less than one hectare) is found on the eastern side of the site. This thin ribbon of marsh vegetation is associated with a tributary of Etobicoke Creek.

The dominant plant species include Fowl Manna Grass (*Glyceria striata*) and Reed Canary Grass (*Phalaris arundinacea*).

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE LF-2N

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Thicket	<1
Recently Disturbed Field	3
Old Field	<1
Marsh	<1
Other	
Cropland	157
Unclassified	9
TOTAL	172

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting all other cover type areas from the total site area.

Field

Five small pockets of recently disturbed field, totalling 3 hectares, occur on the site. Two are associated with a tributary of Etobicoke Creek in the eastern half of the site. The remaining three are situated in the western half of the site. Recently disturbed fields are dominated by non-native plant taxa.

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS:

Special associations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distribution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

No special vegetation associations or SEUs occur on Site LF-2N.

4.3 FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Twenty-four bird species and four mammal species have been recorded on Site LF-2N. Master species lists are presented in Tables 6 through 9.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

Less than one hectare of marsh habitat is present on the site. It is associated with an unnamed tributary of Etobicoke Creek which drains the northeastern portion of LF-2N. This aquatic habitat appears to be of insufficient size to support associated aquatic wildlife populations but may contain frogs and some marsh birds.

4.3.3 EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Four natural vegetation cover types occur on Site LF-2N. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site LF-2N cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

More than 90% of Site LF-2N (157 ha) is currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer

(Odocoileus virginianus) and granivorous birds) as food sources but rarely support nesting birds. Recently disturbed fields (3 ha) may provide suitable breeding habitat for Savannah Sparrows (Passerculus sandwichensis) and Song Sparrows (Melospiza melodia).

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds. No special habitats are known to occur on Site LF-2N.

4.4 RARE SPECIES

4.4.1 INTRODUCTION:

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation. These are indicated in Tables 5 through 9 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed in Sections 2.2 and 7.1 of this technical appendix and in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.4.2 RARE ANIMAL SPECIES:

None of the animal taxa known to occur on Site LF-2N are considered rare.

4.4.3 RARE PLANT SPECIES:

None of the plant taxa recorded on Site LF-2N are considered rare.

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered are: forestry, trapping, hunting and fishing.

4.5.1 FORESTRY:

No forestry potential or activity exists on the site due to the absence of woodland habitat. Forestry activity is not an important biological resource use on the site.

4.5.2 TRAPPING:

No trapping activity has been reported for Site LF-2N. Trapping is not an important biological resource use.

4.5.3 HUNTING:

No hunting activity has been reported on Site LF-2N. Hunting is not an important biological resource use.

4.5.4 FISHING:

No fishing activity has been reported on Site LF-2N. Fishing is not an important biological resource use.

4.6 SUMMARY-SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to present the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides the background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 2 Summary Site Biological Resources LF-2N

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURCE			
SPECIES	NO. OF INDIVID.	DISTRIBUTION	SPECIES LIST	AQUATIC HABITAT	TERR.WILD. HABITAT	SPECIAL HABITATS	SPECIES LIST	AREA NAT. VEGETAT.	NO. OF COVER TYP.	SPECIAL ASSOC./SEU	FORESTRY	TRAPPING	HUNTING	FISHING
None known or reported			• 24 bird species • 4 mammal species	• unnamed tributary of Etobicoke Creek	• 4 natural vegetation cover types • no forest habitat present • some thicket, old field, marsh (<3 ha)	•None reported	• 41 plant species	• Upland Thicket <1 ha • Recently Disturbed Field 3 ha • Old Field <1 ha • Marsh <1 ha	• 4 natural vegetation cover types - see list to left	• None reported	• None reported	• None reported	• None reported	• None reported

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

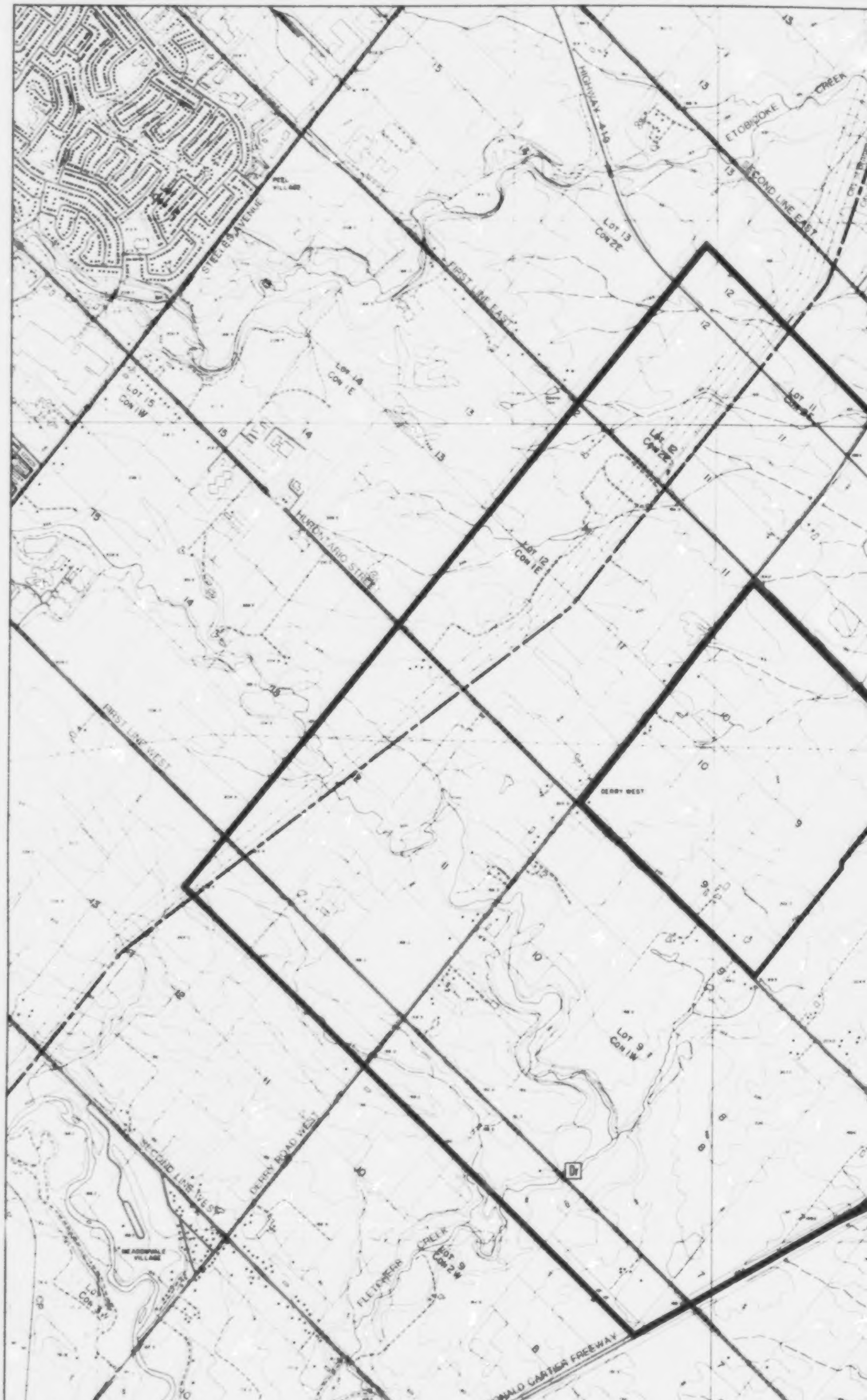
5.1 INTRODUCTION

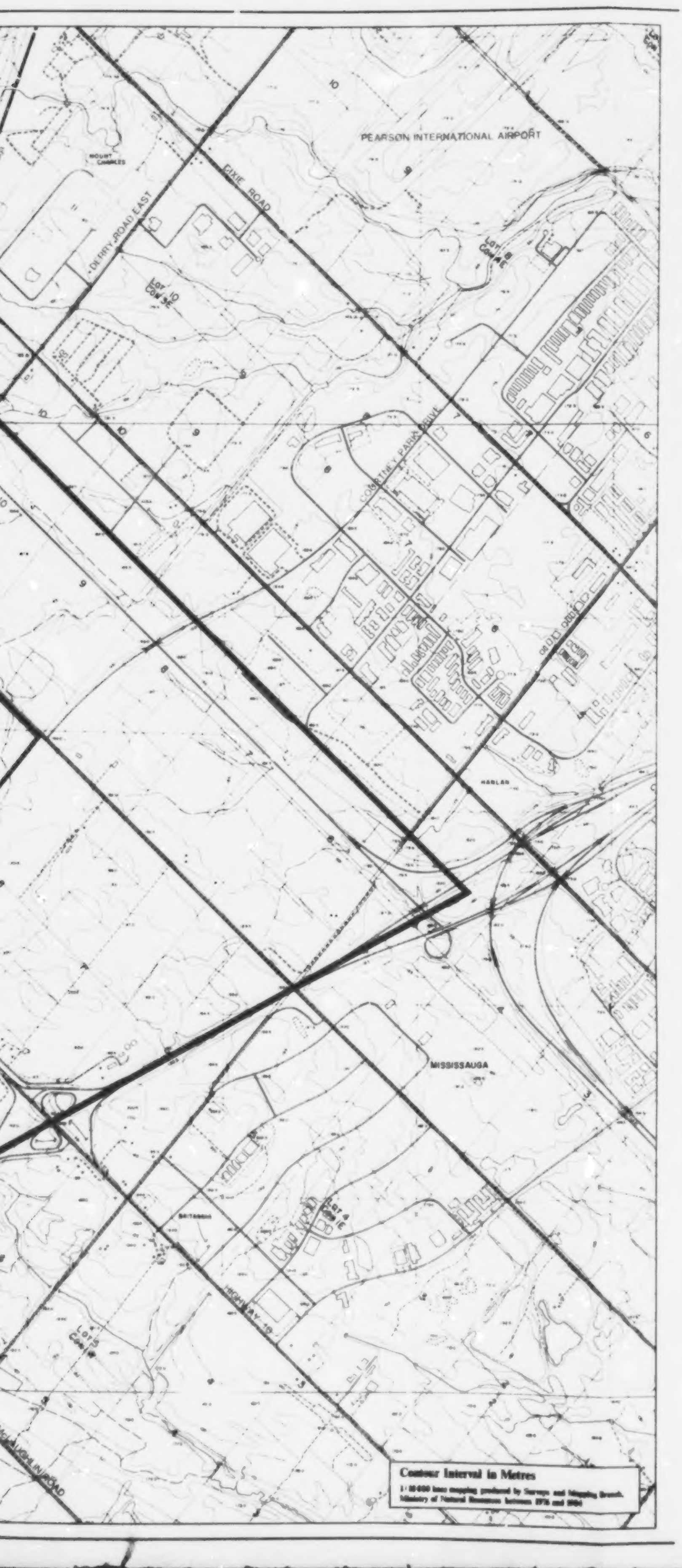
Site vicinity is defined as the area which lies outside Site LF-2N within approximately a 2.0 km radius of the acquisition boundary. The LF-2N site vicinity boundary is delineated in Figure 4 and referred to as "Site Vicinity Study Area Boundary".

A total of 45 plant species has been recorded in the site vicinity (Table 5). Forty-two of the 50 bird species known from the site vicinity are permanent or summer residents which possibly breed in the area (Table 6). An additional 12 species of mammals, four species of reptiles and amphibians, and 15 species of fish are reported to occur in the site vicinity (Tables 7 through 9 respectively).

With the exception of scattered mixed and deciduous forest, the pattern of vegetation cover types found throughout the site vicinity is similar to that which exists on the site itself.

Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations and rare species.


STEELES AVENUE
HIGHWAY 410
ETOBICOKE CREEK
SECOND LINE EAST
FIRST LINE EAST
LOT 13 CON 2E
LOT 14 CON 1E
LOT 15 CON 1W
LOT 11 CON 2E
LOT 12 CON 2E
LOT 12 CON 1E
HURONTARIO STREET
FIRST LINE WEST
DERRY WEST
LOT 9 CON 1W
SECOND LINE WEST
DERRY ROAD WEST
MEADOWVALE VILLAGE
FLETCHERS CREEK
LOT 9 CON 2W
MACDONALD CARTIER FREEWAY
LOT 6 CON 2W
CREDIT RIVER
HIGHWAY 401
BRITANNIA ROAD


PEARSON INTERNATIONAL AIRPORT
MOUNT CHARLES
DERRY ROAD EAST
DIXIE ROAD
COURTNEYPARK DRIVE
HARLAN
MISSISSAUGA
Contour Interval in Metres
1:10 000 base mapping produced by Surveys and Mapping Branch, Ministry of Natural Resources between [illegible] and [illegible]

Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

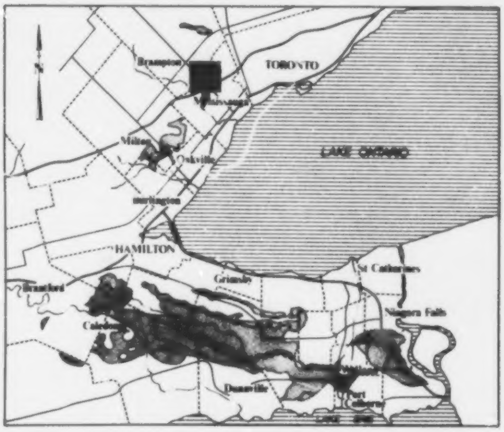
Rare Species Location

ANIMALS	PLANTS
Dr Redside Dace	

— Phase 3B Acquisition Boundary ▬ Site Vicinity Study Area Boundary

Key Map: **LF-2 North**

Lots 9 and 10; Concession I EHS (East of Hurontario Street), City of Mississauga


N
Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
St Catharines
Grimsby
Brantford
Niagara Falls
Caledonia
Dunnville
Port Colborne
LAKE ERIE

1000 feet 0 1000
500 metres 0 500

EXISTING BIOLOGICAL CONDITIONS, PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

September 1985 FIGURE 4

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definitions of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology". No SEUs occur within the LF-2N site vicinity.

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

None of the fish and wildlife features of Site LF-2N is considered to be of significance.

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within the site vicinity. Four natural vegetation associations are represented. The approximate area of each vegetation association is indicated in Table 3. Much of the natural vegetation is concentrated along Fletchers Creek, a creek valley situated several hundred metres west of the site. Small patches of deciduous woods, mixed woods, thicket and successional field are found scattered throughout the site vicinity.

Forest

A mosaic of deciduous and mixed forest is present in the site vicinity. The deciduous woods represent the

TABLE 3: AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, LF-2N

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
Deciduous Forest	35
Mixed Forest	13
Thicket	<1
Successional Field	12
TOTAL	61

* Areas are approximate and are rounded to whole numbers.

largest component of natural vegetation, occupying approximately 35 hectares.

The woods are fragmented and widely scattered blocks varying from less than one to about 14 hectares in size.

Four small blocks of mixed forest (13 ha) occur in the site vicinity.

Thicket

One small pocket of thicket (less than one hectare) has been identified along Fletchers Creek near the west edge of the vicinity.

Successional Field

Seven small patches of successional field occur throughout the vicinity and occupy a total of 12 hectares.

Since no field work was conducted in the site vicinity, the significance of site vicinity natural vegetation units as wildlife habitat can only be speculated upon. Woodlots are found in the site vicinity, a habitat type which is altogether lacking on the site itself. These wooded areas undoubtedly harbour a greater diversity of wildlife. The pockets of natural forest cover associated with Fletchers Creek may function as a travel corridor for fish and wildlife.

5.5 RARE SPECIES

Where known, the approximate locations of rare species ocurring in the site vicinity are mapped in Figure 4 at an original scale of 1:10,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. For information concerning actual numbers of individuals of rare species and their site vicinity distribution, the reader is referred to the accompanying text of Section 5.5.

5.5.1 RARE ANIMAL SPECIES:

One rare fish species has been recorded from the LF-2N site vicinity.

Redside Dace (*Clinostomus elongatus*)

Redside Dace have been recorded in the LF-2N site vicinity on two occasions (Ecoplans Limited 1981a; Ontario Ministry of Natural Resources 1982). Both records involve fish captured in Fletchers Creek where it is crossed by McLaughlin Road (Figure 4).

In Canada, the distribution of this species is represented by disjunct populations restricted to cool, clear streams of the lower Great Lakes basin.

McAllister *et al*. (1985) have classified the Redside Dace as threatened in Canada, since it is known to occur only in streams flowing into western Lake Ontario "where it is much less common now than 30 years ago" (Scott and Crossman 1973).

Gilbert (1980) reports that while the Redside Dace may be locally abundant, it is generally rare and has recently been extirpated from many areas.

Habitat alteration due to intensive agricultural practices and urbanization has apparently contributed to a recent population decline in Ontario. The species is particularly sensitive to turbidity.

The Redside Dace is presently considered to be threatened in southern Ontario (Beak Consultants Limited 1980) and threatened in Canada (McAllister *et al*. 1985).

5.5.2 RARE PLANT SPECIES:

No rare plant species have been recorded from the LF-2N site vicinity.

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information, as summarized in Table 4, provides the background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources LF-2N

FACTORS AND INDICATORS

	SIGNIFICANT ENVIRONMENTAL UNITS	FISH AND WILDLIFE FEATURES OF SIGNIFICANCE	OTHER NATURAL VEGETATION	RARE SPECIES
EXISTING SITE VICINITY CONDITIONS	None in Site Vicinity	None in Site Vicinity	• Deciduous Forest 35 ha • Mixed Forest 13 ha • Thicket <1 ha • Successional Field 12 ha	Animals • Redside Dace

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7.0 SPECIES LIST

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 9) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins et al. 1982) and fish (Scott and Crossman 1973).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 9. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined; these are sources 3,12 and 14.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", "Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

A regional perspective was obtained from several sources.

An Environmentally Sensitive Areas (ESA) study for the Credit Valley Conservation Authority (Ecologistics Limited 1979) addresses the rare plant species in the region.

A regional perspective was also obtained from The Vascular Plant Flora of Peel County (Webber 1984). This annotated checklist provides the most current information concerning plant status and distribution in Peel Region.

Material referred to for status information outside, but adjacent to, Peel Region included a working file of plant status in Halton Region, maintained by W.J. Crins at the Erindale Herbarium (University of Toronto), and other background data.

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reports where applicable.

Frequency and relative abundance standards are assigned to Ontario birds by James et al. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for a comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

More recent information on the status of breeding birds in Peel Region was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April 1984, 20 species of mammals are designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not addressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammalian fauna of the Regional Municipality of Peel. Information supplied by local naturalists and recognized authorities in the field of mammalogy are largely relied upon to determine the regional status of particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and South Wellington Counties was also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from what was formerly Peel County; however, they do not assign status. A cursory and somewhat outdated account of the reptiles and amphibians of Peel County is provided by Palermo (1969).

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister et al. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species is presently protected in Ontario by "Endangered" species legislation. The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disproportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitative definitions of rarity could be proposed with a considerable degree of confidence. However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist, but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of

Guelph, and the National Museum of Natural Sciences in Ottawa, were consulted on a number of occasions.

In cases where wildlife data were lacking, lengthy discussions were held with appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE LF-2N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
PINACEAE	PINE FAMILY		
Pinus resinosa Ait.	Red Pine		1
P. strobus L.	White Pine		1,4
Picea glauca (Moench) Voss	White Spruce		5
Tsuga canadensis (L.) Carr.	Eastern Hemlock		5
CUPRESSACEAE	CYPRESS FAMILY		
Thuja occidentalis L.	Eastern White Cedar		5
TYPHACEAE	CATTAIL FAMILY		
Typha angustifolia L.	Narrow-leaved Cattail	3	
POACEAE	GRASS FAMILY		
Bromus inermis Leyss.	Smooth Brome Grass	3	
Glyceria striata (Lam.) A.S. Hitchc.	Fowl Manna Grass	3	
Agropyron repens (L.) Beauv.	Quack Grass	3	
Agrostis gigantea Roth.	Redtop	3	
Phalaris arundinacea L.	Reed Canary Grass	3	
Panicum capillare L.	Witch Grass	3	
Setaria glauca (L.)	Yellow Foxtail	3	
SALICACEAE	WILLOW FAMILY		
Populus tremuloides Michx.	Trembling Aspen		5

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
JUGLANDACEAE	WALNUT FAMILY		
Juglans nigra L.	Black Walnut		6
Carya cordiformis (Wang.) K. Koch.	Bitternut Hickory		1,5
C. *ovata* (Mill.) K. Koch.	Shagbark Hickory		1
BETULACEAE	BIRCH FAMILY		
Ostrya virginiana (Mill.) K. Koch.	Hop Hornbeam		1,5
Betula papyrifera Marsh.	Paper Birch		5
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech		5
Quercus alba L.	White Oak		1
Q. macrocarpa Michx.	Bur Oak		1
Q. rubra L.	Red Oak		1,5,4
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	3	5,4
U. pumila L.	Siberian Elm		1
U. rubra Muhl.	Slippery Elm		5,4
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex crispus L.	Curled Dock	3	
Polygonum persicaria L.	Lady's Thumb	3	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium album L.	Lamb's-quarters	3	
Atriplex patula L.	Spreading Atriplex	3	
AMARANTHACEAE	AMARANTH FAMILY		
Amaranthus retroflexus L.	Redroot Pigweed	3	
ROSACEAE	ROSE FAMILY		
Pyrus communis L.	Pear		5
Malus domestica Borkh.	Apple		5
Rubus allegheniensis Porter	Common Blackberry		5
R. idaeus L. var. strigosus (Michx.) Maxim.	Wild Red Raspberry	3	
R. odoratus L.	Purple-flowering Raspberry		5
Geum allepicum Jacq. var. strictum (Ait.) Fern.	Yellow Avens	3	
Prunus serotina Ehrh.	Black Cherry		5
P. tomentosa	Manchu Cherry	3	
P. virginiana L.	Choke Cherry		5
FABACEAE	PEA FAMILY		
Gleditsia tricanthos L.	Honey-locust		1
Medicago sativa L.	Alfalfa	3	
Trifolium pratense L.	Red Clover	3	
Lotus corniculatus L.	Bird's-foot Trefoil	3	
ANACARDIACEAE	CASHEW FAMILY		
Rhus radicans L.	Poison Ivy		1,5
R. typhina L.	Staghorn Sumac	1	5

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ACERACEAE	MAPLE FAMILY		
Acer negundo L.	Manitoba Maple		5
A. platanoides L.	Norway Maple		1
A. rubrum L.	Red Maple		1
A. saccharinum L.	Silver Maple	1	
A. saccharum Marsh.	Sugar Maple		1,5,4
HIPPOCASTANACEAE	BUCKEYE FAMILY		
Aesculus hippocastanum L.	Horse-chestnut		1
RHAMNACEAE	BUCKTHORN FAMILY		
Rhamnus cathartica L.	Buckthorn		5
VITACEAE	GRAPE FAMILY		
Vitis riparia Michx.	Wild Grape		5,4
Parthenocissus quinquefolia L.	Virginia Creeper		5
P. vitacea (Knerr.) Hitchc.	Virginia Creeper		1
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	3	1,5,4
LYTHRACEAE	LOOSESTRIFE FAMILY		
Lythrum salicaria L.	Purple Loosestrife	3	
ADIACEAE	CARROT FAMILY		
Daucus carota L.	Wild Carrot	3	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CORNACEAE	DOGWOOD FAMILY		
Cornus rugosa Lam.	Round-leaved Dogwood		5
C. stolonifera Michx.	Red Osier		5
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash		1,5
F. nigra Marsh.	Black Ash	3	1,5
F. pennsylvanica Marsh.	Red Ash		1,5
F. pennsylvanica var. *subintegerrima*	Green Ash		4,5
ASCLEPIADACEAE	MILKWEED FAMILY		
Asclepias syriaca L.	Common Milkweed	3	
VERBENIACEAE	VERVAIN FAMILY		
Verbena hastata L.	Blue Vervain	3	
LAMIACEAE	MINT FAMILY		
Nepeta cataria L.	Catnip		
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum dulcamara L.	Climbing Nightshade	3	
SCROPHULARIACEAE	FIGWORT FAMILY		
Verbascum thapsus L.	Common Mullein	3	
Linaria vulgaris Mill.	Yellow Toadflax	3	
PLANTAGINACEAE	PLANTAIN FAMILY		
Plantago major L.	Broad-leaved Plantain	3	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Lonicera dioica L.	Glaucous Honeysuckle		5
L. tatarica	Tartarian Honeysuckle		5
ASTERACEAE	ASTER FAMILY		
Solidago canadensis L.	Canada Goldenrod	3	
Aster novae-angliae L.	New England Aster	3	
Erigeron annuus (L.) Pers.	Annual Fleabane	3	
Ambrosia artemisiifolia	Common Ragweed	3	
Bidens cernua L.	Nodding Beggar-ticks	3	
Artemisia biennis Willd.	Biennial Wormwood	3	
Arctium minus (Hill.) Bernh.	Common Burdock	3,14	
Cichorium intybus L.	Chickory	3	
Taraxacum officinale Weber	Dandelion	3	
Lactuca canadensis L.	Canada Lettuce	3	

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE LF-2N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Canada Goose	*Branta canadensis*		7,9
Mallard	*Anas platyrhynchos*		7
Red-tailed Hawk	*Buteo jamaicensis*	3	1,2,4
Killdeer	*Charadrius vociferus*	1	4
Spotted Sandpiper	*Actitis macularia*		4
Ring-billed Gull	*Larus delawarensis*	1	4
Herring Gull	*Larus argentatus*		4
Rock Dove	*Columba livia*	1	4
Mourning Dove	*Zenaida macroura*	1	4,7
Great Horned Owl	*Bubo virginianus*		2,4
Belted Kingfisher	*Ceryle alcyon*		4
Red-headed Woodpecker	*Melanerpes erythrocephalus*		1
Downy Woodpecker	*Picoides pubescens*	1	4
Northern Flicker	*Colaptes auratus*	1	4
Pileated Woodpecker	*Dryocopus pileatus*		4
Eastern Wood-Pewee	*Contopus virens*	1	
Yellow-bellied Flycatcher	*Empidonax flaviventris*		1
Willow Flycatcher	*Empidonax traillii*		4
Least Flycatcher	*Empidonax minimus*		4
Eastern Phoebe	*Sayornis phoebe*		4
Great Crested Flycatcher	*Myiarchus crinitus*		4
Eastern Kingbird	*Tyrannus tyrannus*	1	4
Purple Martin	*Progne subis*		9
Bank Swallow	*Riparia riparia*		4
Barn Swallow	*Hirundo rustica*		4
Blue Jay	*Cyanocitta cristata*	1	4,7
American Crow	*Corvus brachyrhynchos*	1,12	4
Black-capped Chickadee	*Parus atricapillus*	1	4
Wood Thrush	*Hylocichla mustelina*		4
American Robin	*Turdus migratorius*	1	4
Gray Catbird	*Dumetella carolinensis*	1	4
Brown Thrasher	*Toxostoma rufum*		4
Cedar Waxwing	*Bombycilla cedrorum*		4
European Starling	*Sturnus vulgaris*	1	4,9
Red-eyed Vireo	*Vireo olivaceus*		4
Yellow Warbler	*Dendroica petechia*		4
Chestnut-sided Warbler	*Dendroica pensylvanica*	22	

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Common Yellowthroat	*Geothlypis trichas*		4
Northern Cardinal	*Cardinalis cardinalis*		4,7
Indigo Bunting	*Passerina cyanea*		4
Chipping Sparrow	*Spizella passerina*		4
Field Sparrow	*Spizella pusilla*		4
Vesper Sparrow	*Pooecetes gramineus*		4
Savannah Sparrow	*Passerculus sandwichensis*	1	4
Song Sparrow	*Melospiza melodia*	1	4
Bobolink	*Dolichonyx oryzivorus*	12	
Red-winged Blackbird	*Agelaius phoeniceus*	1,12	4,7
Eastern Meadowlark	*Sturnella magna*		4
Common Grackle	*Quiscalus quiscula*	1	2,4
Brown-headed Cowbird	*Molothrus ater*		4
Northern Oriole	*Icterus galbula*	1	4
American Goldfinch	*Carduelis tristis*	1,3	4
House Sparrow	*Passer domesticus*	1,12	4

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE LF-2N AND IN SITE VICINITY

COMMON NAME	LATIN NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
Eastern Cottontail	Sylvilagus floridanus		1,7,4,11
European Hare	Lepus europaeus		4
Woodchuck	Marmota monax	1	4
Grey Squirrel	Sciurus carolinensis		1,4
American Red Squirrel	Tamiasciurus hudsonicus		4
Muskrat	Ondatra zibethicus		4,7,9
Meadow Vole	Microtus pennsylvanicus	1	4
Meadow Jumping Mouse	Zapus hudsonius		4
Wolf	Canis lupus	8	
Red Fox	Vulpes vulpes		4,11
Raccoon	Procyon lotor	1,3	4
Striped Skunk	Mephitis mephitis		4
White-tailed Deer	Odocoileus virginianus		1,4,10

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE LF-2N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
American Toad	*Bufo a.americanus*		4
Green Frog	*Rana clamitans*		4
Common Snapping Turtle	*Chelydra s. serpentina*		4
Eastern Garter Snake	*Thamnophis s. sirtalis*		4

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE LF-2N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Goldfish	Carassius auratus		9
Northern Redbelly Dace	Chrosomus eos		5
Redside Dace	Clinostomus elongatus *		13,5
Carp	Cyprinus carpio		9
Common Shiner	Notropis cornutus		13,5
Bluntnose Minnow	Pimephales notatus		13
Fathead Minnow	Pimephales promelas		4,5
Blacknose Dace	Rhinichthys atratulus		13,5
Creek Chub	Semotilus atromaculatus		4,5,13
White Sucker	Catostomus commersoni		5,13
Northern Hog Sucker	Hypentelium nigricans		13
Rock Bass	Ambloplites rupestris		4,5
Pumpkinseed	Lepomis gibbosus		4
Rainbow Darter	Etheostoma caeruleum		13
Johnny Darter	Etheostoma nigrum		5,13

* Denotes that the species is considered to be rare based upon recognized literature sources (see Section 5.5)

DATA SOURCES FOR TABLES 5-9

1. Landplan Collaborative and Ecological Services for Planning, 1982
2. Ontario Breeding Bird Atlas, 1984.
3. Gartner Lee Associates Limited, 1984a.
4. Ecoplans Limited, 1981a.
5. Ecoplans Limited, 1981b.
6. Anacleto, 1984.
7. Nugent, 1984.
8. Acri, 1984.
9. Todd, 1984.
10. Stocks, 1984.
11. Bunge, 1984.
12. Gartner Lee Associates Limited, 1984b.
13. Ontario Ministry of Natural Resources, 1982.
14. Gartner Lee Associates Limited, 1984c.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site LF-2N from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 10. Interview numbers are related to identifications assigned by Ecologistics Limited during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview forms are contained in Table 11. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-2N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
C. Nugent/H. Ross	96-040	LF-2N (SV)	IER#4	- several bird species
Mr. Ed Scace	117-248	LF-2N (S)	IER#3	- none
Mr. & Mrs. W.W. Golden	117-248-00	LF-2N (S)	26-1	- harvest berries
Mr. William Acri	117-248 117-077	LF-2N (S)	283	- wolf years ago
Mr. & Mrs. Anacleto	96-036	LF-2N (SV)	70-1	- fuelwood
Mr. Brian Smith	60-071 (117-248?)	LF-2N (S)	44-2	fuelwood

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-2N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Knob Hill Farms Ltd.	98-261 98-259	LF-2N (SV)	76-2	- none
Mr. Ken Gibb	117-075	LF-2N (S)	50-2	- none
Mrs. Dianne Drysdale	96-027	LF-2N (SV)	436	- none
Mr. Aulakh	117-242	LF-2N (SV)	214-1	- none
Mr. J.A. Todd	96-034	LF-2N (SV)	241-2	- several bird species - fuelwood - harvest raspberries
Mr. Harold Shipp	96-077 96-041	LF-2N (SV)	264-2	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-2N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Robert Kilpatrick	96-039-00	LF-2N (SV)	137-1	- none
Mr. William Stocks	117-039-00	LF-2N (SV)	74-1	- deer
Mr. Bunge	96-037	LF-2N (SV)	72-1	- fox, rabbits, owls, hawks - harvests strawberries, leeks, onions, potatoes, beans from garden
Mr. David Jeffries	117-074	LF-2N (S & SV)	36-1	- none
Mr. S. Casar	117-241-00	LF-2N (SV)	34-1	- harvests from garden
Dr. Ivan Sparling	117-076-00	LF-2N (S)	218-2	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-2N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. D.S. McClure	117-075	LF-2N (S)	706	- none
	117-074	LF-2N (S & SV)		
	96-041 96-077 117-021 117-020	LF-2N (SV)		
Mrs. P. Lavin	117-246-10	LF-2N (S)	32-1	- harvest berries and vegetables from garden

Interview Identification Number: ________

TABLE 11: BIOLOGY QUESTIONS LISTED ON WALK-AND-TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

9.0 BIOLOGY

SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale. Completed data forms and station location maps are in working files at GLAL.

Table 12 is an example of a completed field data form. It is for station 3 on Site LF-2N.

LF-2N

TABLE 12: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - LF-2N

FIELD INVESTIGATIONS

STATION 3 ROLL 4 PHOTO(S) 20

VEGETATION

VEGETATION ASSOCIATION Fr FRI DOMINANTS

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species >6m			
Tree Species <6m	5		Ulmus americana
Shrub Species >1.5 m			
Shrub Species <1.5 m			Rubus idaeus var strigosus
Graminoid/Herb Species	90		Nepeta cataria Linaria vulgaris Aster novae angliae
Moss/Lichen Species			

Snags/Hectare

Average Canopy Height: FRI ___, Field ___ Surface Wetness ___ Vegetation Mapping Change ___

Comments / Rare Or Uncommon Species:

WILDLIFE

Red-tailed Hawk - 1(c)

Comments/Rare Or Uncommon Species:
soaring over station 3

AQUATIC HABITAT

Type S Average Width .5m Average Depth .5m Permanence i Turbidity ___

Approximate Area /

Shoreline Conditions V Bottom Conditions C

Fish And Invertebrate Species Observed:

Submergent, Emergent Plant Species: / Phalaris arundinacea

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

also

Arctium minus

Asclepias syriaca

Botanical Verification:

Sonchus arvensis

Geum allepicum var. strictum

Chenopodium album

LF-2N-06) Erigeron strigosus Muhl.

10.0 OWMC PHASE 4A - BIOLOGY FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2

SEPTEMBER, 1984

Gartner Lee Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex-06-986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m^2. The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m^2 gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m^2. Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.0 APPENDICES

3.1 SITE ACCESS PERMISSION FORM

No. __________

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ______________________________
____

LANDOWNER:
NAME ______________________________
ADDRESS ______________________________

TELEPHONE NUMBER ______________________________

LANDOWNER CONTACTED BY:
TELEPHONE __________ DATE OF CONTACT:
MAIL __________ ____________________
VISIT __________

PERMISSION TO ENTER PROPERTY:
GRANTED __________
NOT GRANTED __________ REASON ____________________

PERMISSION TO COLLECT PLANT SAMPLES:
GRANTED __________
NOT GRANTED __________ REASON ____________________

COMMENTS: ______________________________
____
____
____
____

Gartner
Lee
Associates

3.2

FIELD OBSERVATION SHEET | BIOLOGICAL STATIONS : SITE

Candidate Site: ____________________

OWMC 84-S18.2

Gartner Lee Associates Limited

A) Background

Air Photos: ____________________

Photographs Taken:

Roll: ________ **Photos:** ____________________

Corresponding Maps:

____

____

Observer(s): ____________________

Date Of Visit: ____________________

Time & Duration ____________________

Weather:

Present: ____________________

Previous Day: ____________________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ____________________

____

____

Flora: ____________________

____

____

Fauna: ____________________

____

____

Comments: ____________________

____

____

____

____

____

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

• Vegetation Association

Forest:	deciduous	D	Upland = u Lowland = l
	coniferous	C	
	mixed	M	
Thicket:	shrub	T	
Field:	crop land	C	
	recently abandoned	FR	
	old	FO	
	successional	FS	
Others:	marsh	M	
	industrial/residential/manicured	R	

Descriptors:

flooded	(F)
cutover and/or recent secondary succession	(C)
post-fire succession	(P)
grazed	(G)
drained	(D)
plantation	(Pl)

• Surface Wetness

dry	0
moist	1
wet	2

Wildlife

• Observation Code

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

• Type

stream	s
pond	p
diffuse ponding and swales	dp

• Permanence

possibly permanent	p
probably intermittent	pi
intermittent	i

• Turbidity

clear	c
cloudy	cl
turbid	t

• Shoreline Conditions

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

• Bottom Conditions

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

Page ___ of ___

SITE

SITE ______

FIELD INVESTIGATIONS

STATION ______ ROLL ______ PHOTO(S) ______

VEGETATION

VEGETATION ASSOCIATION ______ FRI DOMINANTS ______

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species>6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species <1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ______

Average Canopy Height: FRI ______, Field ______ Surface Wetness ______ Vegetation Mapping Change ______

Comments / Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ______ Average Width ______ Average Depth ______ Permanence ______ Turbidity ______

Approximate Area ______

Shoreline Conditions ______ Bottom Conditions ______

Fish And Invertebrate Species Observed: ______

Submergent, Emergent Plant Species: ______

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

Page of

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No. ______

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ______________________________

____

LANDOWNER:

NAME ______________________________

ADDRESS ______________________________

TELEPHONE NUMBER ______________________________

LANDOWNER CONTACTED BY:

TELEPHONE ________

MAIL ________

VISIT ________

DATE OF CONTACT:

____

ISSUE(S) TO DISCUSS:

____

____

____

____

____

____

____

REMARKS:

SKETCH MAP:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees.

CONIFEROUS: forest is composed of 80% or more coniferous trees.

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

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In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include Crataegus sp., Cornus racemosa and Spirea alba.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).

Others:

WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including *Typha angustifolia* and *Scirpus atrovirens*. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

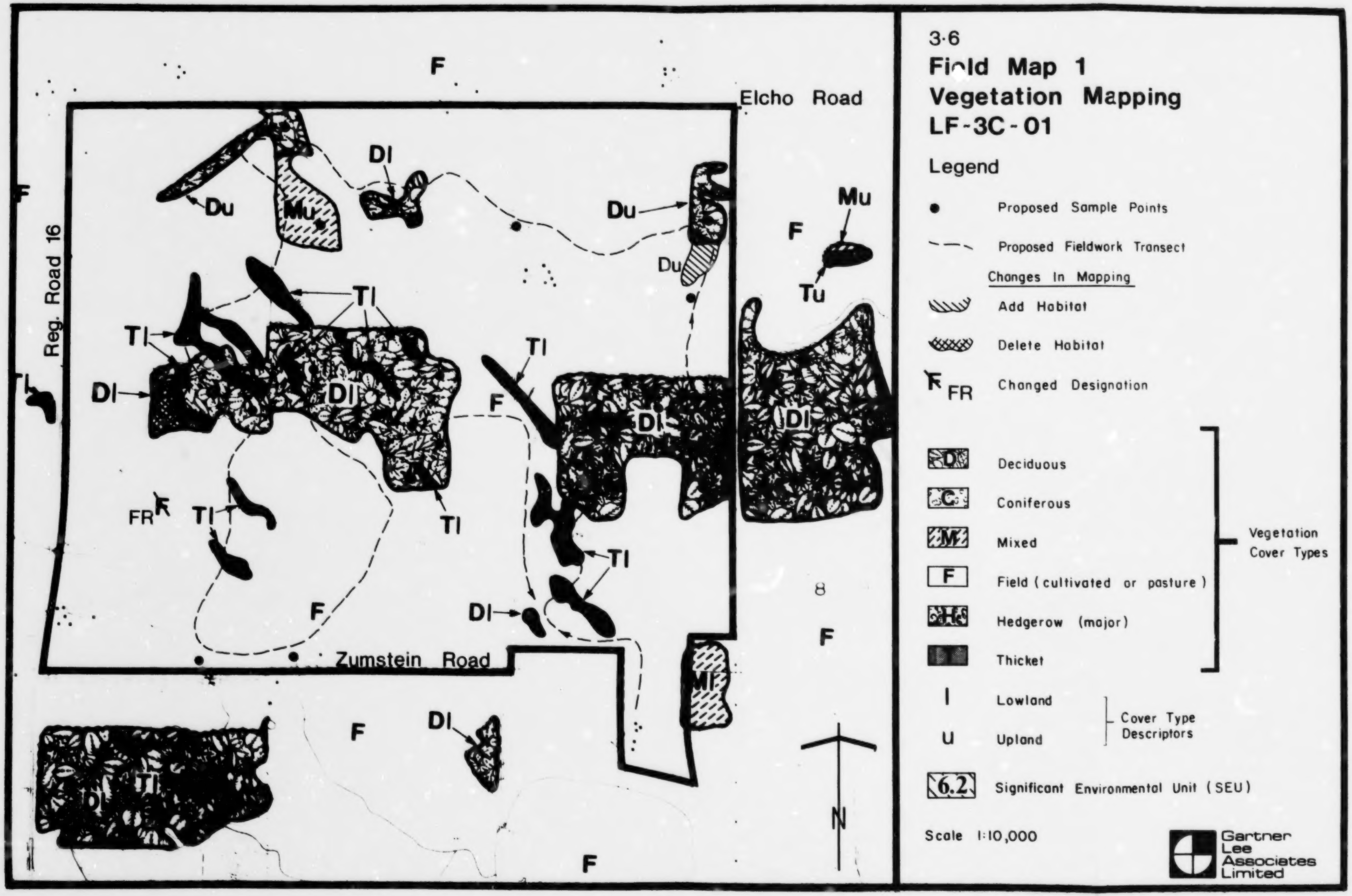
PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

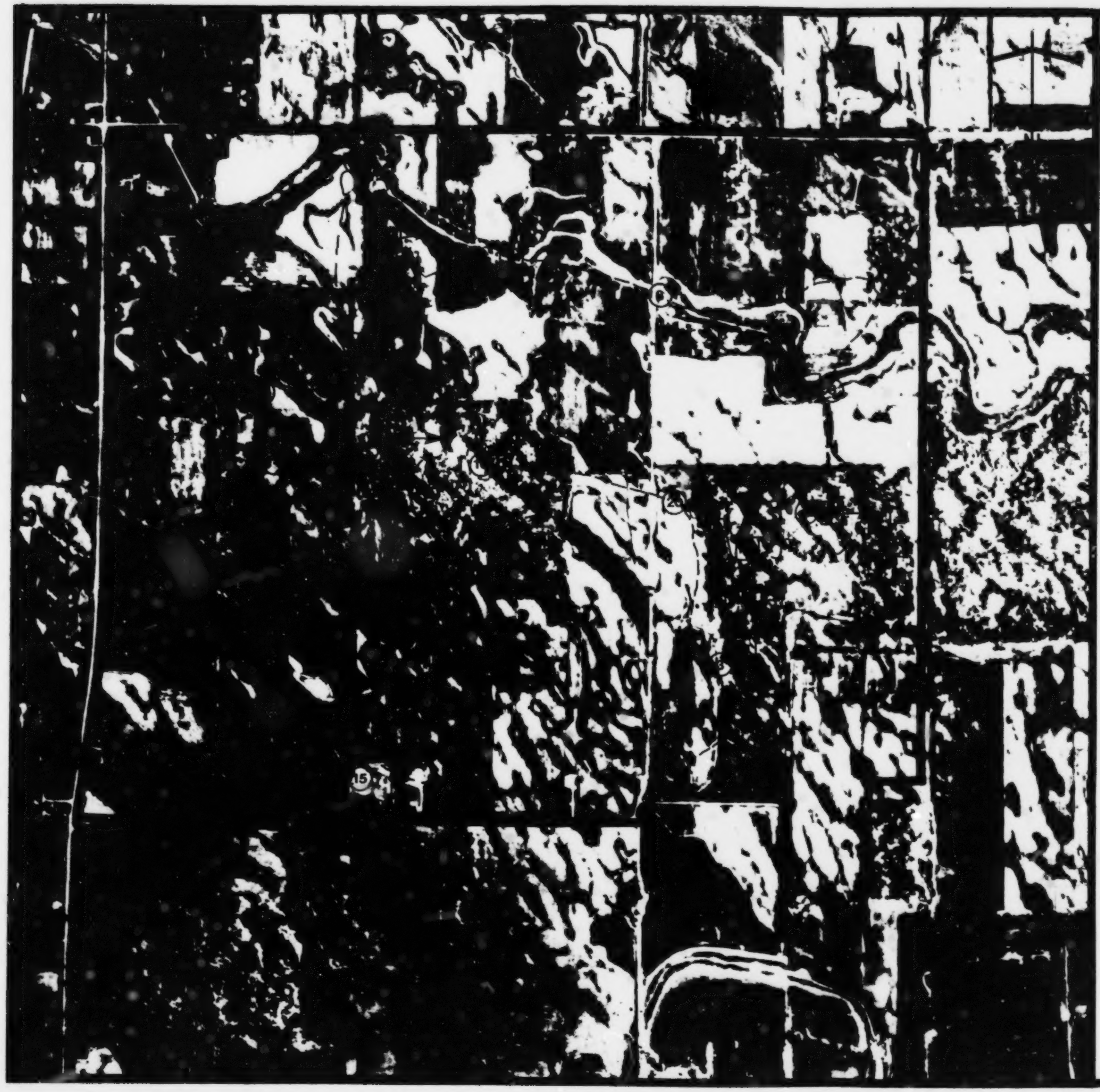
Herbarium / Reseacher / Date

County	Township	Lot—Con.	Location	Date	Collector	No.	Habitat and Notes


3·6

Field Map 1
Vegetation Mapping
LF-3C-01

Legend
● Proposed Sample Points
Proposed Fieldwork Transect
Changes In Mapping
Add Habitat
Delete Habitat
FR Changed Designation
D Deciduous
C Coniferous
M Mixed
F Field (cultivated or pasture)
H Hedgerow (major)
Thicket
Vegetation Cover Types
l Lowland
u Upland
Cover Type Descriptors
6.2 Significant Environmental Unit (SEU)
Scale 1:10,000
Gartner Lee Associates Limited
F
Elcho Road
Reg. Road 16
Zumstein Road
Dl
Du
Mu
Tl
Tu
FR
Ml
8
N



3·7

Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥ Field Observation Station (example)

P6 ➤ Photograph And Direction Taken

- - Transect Followed In Field

MAP NOTES

Scale 1:10,000

Gartner
Lee
Associates
Limited

3.8 LITERATURE CITED

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Number/
Numéro

5

SITE SELECTION PROCESS PHASE 4A:
TECHNICAL APPENDIX LF-4N -
EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee
Associates Limited

Gartner Lee Associates Limited

Consulting Engineering
Geologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex-06-986278

September 13, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West,
11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix LF-4N - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site LF-4N.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly
GARTNER LEE ASSOCIATES LIMITED

Grant Anderson

E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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BIOLOGICAL RESOURCES STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr. - Associate and Senior Biologist of GLAL - Report Review

Kenneth Dance, M.Sc. - Associate and Senior Biologist of GLAL - Report Writing and Project Management

Thomas Hilditch, B.Sc.,Agr. - Biologist of GLAL - Data Collection

Donald Fraser, M.Sc. - Biologist of GLAL - Site Report Preparation

Wayne Weller, M.Sc. - Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site LF-4N and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Seven natural vegetation cover types occur on the site, including examples of both upland and lowland deciduous forest. One special vegetation association, a swamp-moss hummock complex, is present.

A total of 255 plant species is known from Site LF-4N, of which 13 are considered rare. Wildlife related data indicate the presence of 75 bird species, 15 mammals, 8 reptiles and amphibians and 5 fish. None of these species is considered rare.

Forestry related activities include fuelwood harvesting and maple syrup extraction. Some mammal trapping takes place, however no hunting activity has been reported. Fisheries resource use is restricted to a commercial baitfishing operation on a small portion of the site.

Small portions of two Significant Environmental Units occur within the LF-4N site vicinity. A pond on Indian Creek serves as a waterfowl staging area.

Two rare birds and one rare butterfly species have been reported in the site vicinity.

1.0 INTRODUCTION

1.1 BACKGROUND

The Ontario Waste Management Corporation (OWMC) is involved in a five-phase process for the selection of a siting option for facilities to treat liquid industrial and hazardous wastes. This process has incorporated input from a number of areas of expertise including agriculture, biology, hydrogeology, socioeconomics and transportation.

At the end of the third phase of the site selection process, eight candidate sites within the Golden Horseshoe region of southern Ontario were identified (OWMC 1984). Biological factors developed to fulfill OWMC's goal of minimizing environmental impact were among several factors used in selecting the eight candidate sites. Gartner Lee Associates Limited completed the technical input for biology as reported in "Site Selection Process, Phase 3B: Selection of Candidate Sites - Biology" (GLAL 1984e). In that report, Site LF-4N was thought to possess minor biological constraints.

This report is a technical appendix to "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology" that documents and interprets field data and available biological information for Site LF-4N. It serves as a data base for comparing the eight candidate sites in the facility siting selection process.

1.2 SCOPE AND OBJECTIVES

As noted earlier, the previous Phase 3B evaluation of Site LF-4N was based primarily on existing data. For this Phase 4A assessment, the existing data base has been up-graded where possible and field work has been conducted on the site. The sampling and analytical elements of the program have been designed to meet study objectives and to provide an adequate basis for site comparisons.

Objectives of the Phase 4A biology study are:

- to describe existing biological conditions, on-site and in the site vicinity;
- to refine and confirm the Phase 3B data base through contact with pertinent agencies, experts and the public for both the site and site vicinity, and through field work on-site;
- to determine the level of constraint associated with biological resources;
- to assess the sensitivity and significance of biological resources; and
- to provide the Site Selection Team with biological assessments to use in refining site boundaries and in the siting option comparison.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The bulk of the existing biological information for Site LF-4N is summarized on two maps and in 12 tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

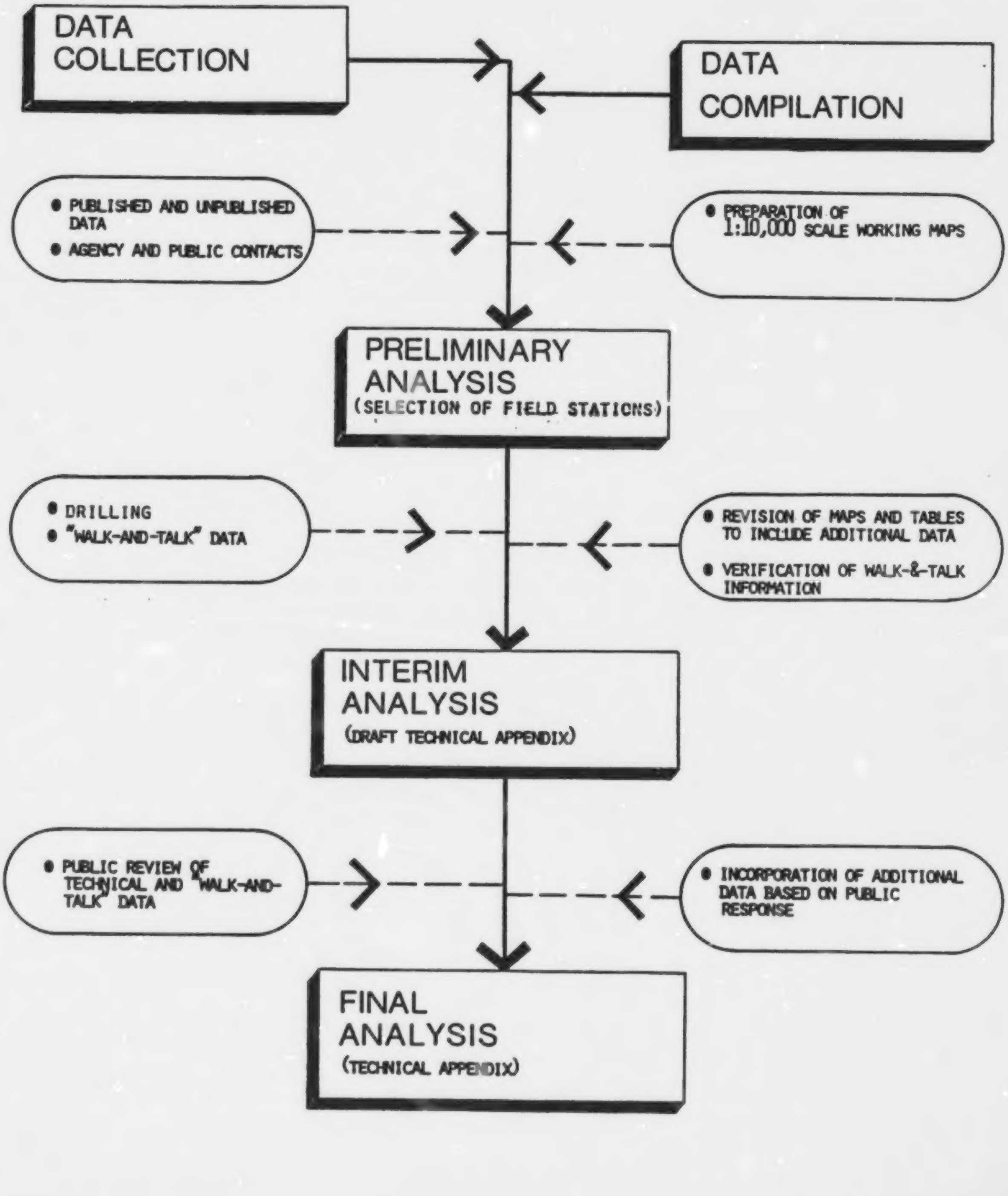
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
PUBLISHED AND UNPUBLISHED DATA
AGENCY AND PUBLIC CONTACTS
PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS
(SELECTION OF FIELD STATIONS)
DRILLING
"WALK-AND-TALK" DATA
REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS
(DRAFT TECHNICAL APPENDIX)
PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS
(TECHNICAL APPENDIX)

Government reports on vegetation and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Halton Region Conservation Authority, the Regional Municipality of Halton, and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site LF-4N are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984d), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

Where important features were known prior to field work, efforts were made to check these.

Reconnaissance field studies on Site LF-4N were conducted on November 14, 1984. Other visits to the site by GLAL biologists occurred on May 14 and 18, June 25, September 19 and November 6 and 12, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site LF-4N residents on August 1, 1984.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and "non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 10. These lists should be considered preliminary and may be incomplete.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the LF-4N site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Halton, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete

evidence such as a photograph and/or specimen, and the potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 10 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences which were discounted during the noteworthy species evaluation were not dealt with further. An example of such a species on Site LF-4N is Whooping Crane (*Grus americana*). This extremely rare species has not been observed in Ontario since the late 1980s (James *et al*. 1976). The sighting reported from Site LF-4N is undoubtedly erroneous. Reports of Wolves (*Canis lupus*) are considered to be incorrect also, and are probably the result of misidentifications of Coyotes (*C. latrans*).

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to faunal species which utilize Site LF-4N and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was also not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

A further public meeting to review the preliminary biological information was held on 7 May 1985. Additional data resulting from public responses were incorporated in the final report.

This technical appendix represents the interpretation of biological features and biological resource use at Site LF-4N to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A" Selection of a Preferred Site(s) - Biology".

3.0 SETTING

3.1 REGIONAL SETTING

Site LF-4N is located in the Regional Municipality of Halton. Its position relative to the other seven OWMC Candidate Sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within acquisition boundaries as portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It is 168 ha in size and includes Lots 6 and 7, Concession 7, Town of Milton, formerly in the Township of Nelson. It is bounded on the northeast by Tremaine Road West (Regional Road 22), on the southeast by Britannia Road (Regional Road 6) and on the southwest by the Bell School Line.

The site is located within the corporate limits of the Town of Milton and is about 2.0 km south of the nearest built-up area. It is about 9.0 km south of Highway 401 and about 10 km north of the Queen Elizabeth Way. Access from the 401 is via the James Snow Parkway (Fourth Line) and west on Britannia Road; from the QEW access is via Highway 25 and west on Britannia Road.

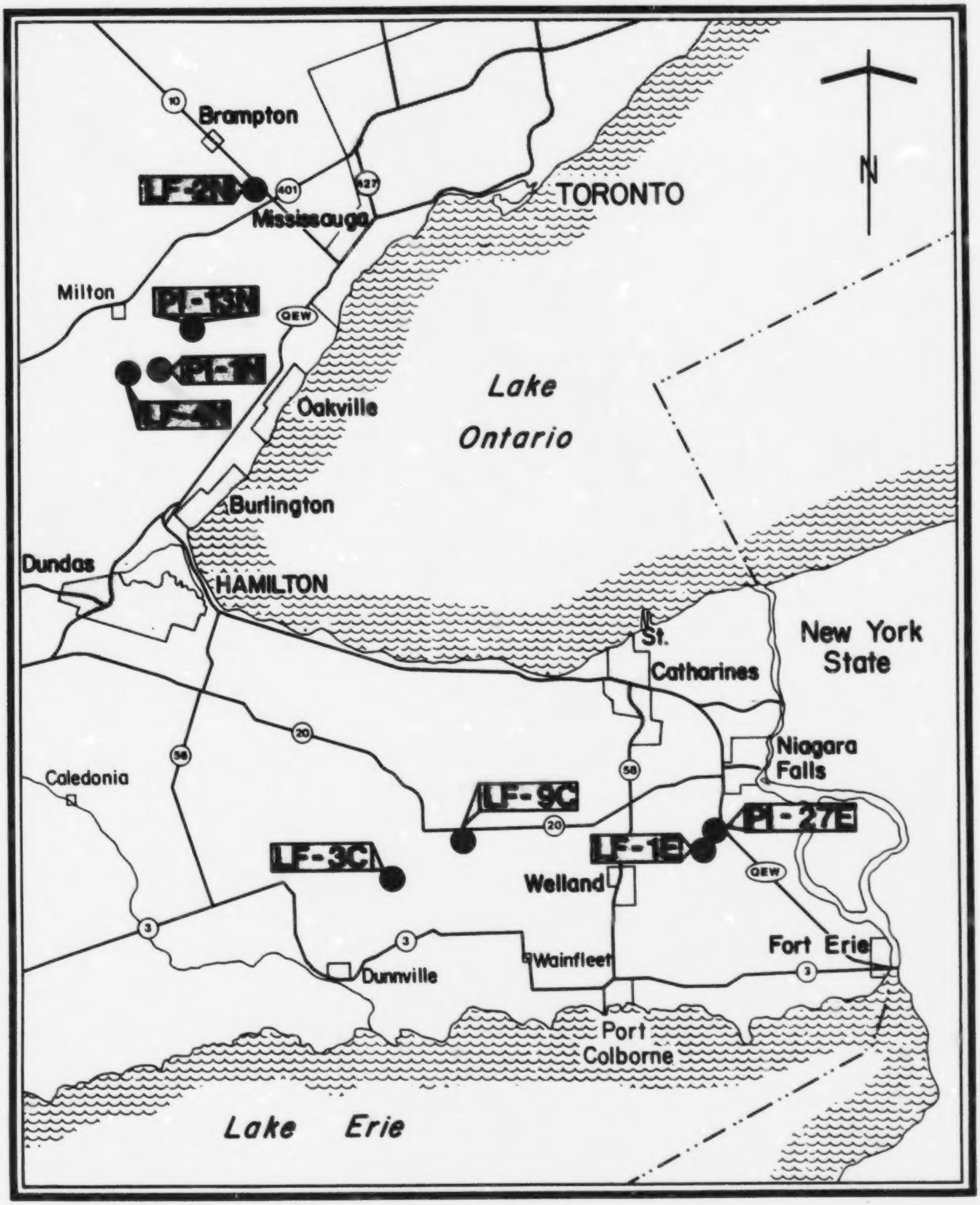

N
Brampton
10
LF-2N
401
427
TORONTO
Mississauga
Milton
PI-13N
QEW
PI-1N
LF-4N
Oakville
Lake
Ontario
Burlington
Dundas
HAMILTON
New York
State
St.
Catharines
20
56
58
Niagara
Falls
Caledonia
LF-9C
20
PI-27E
LF-1E
LF-3C
QEW
Welland
3
3
Wainfleet
Fort Erie
Dunnville
3
Port
Colborne
Lake Erie
Miles 8 0 8 16
Kilometres 10 0 10 20

FIGURE 2 LOCATION OF CANDIDATE SITES

4.0 EXISTING
BIOLOGICAL RESOURCES - SITE

Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

4.1 OVERVIEW OF SITE BIOLOGY

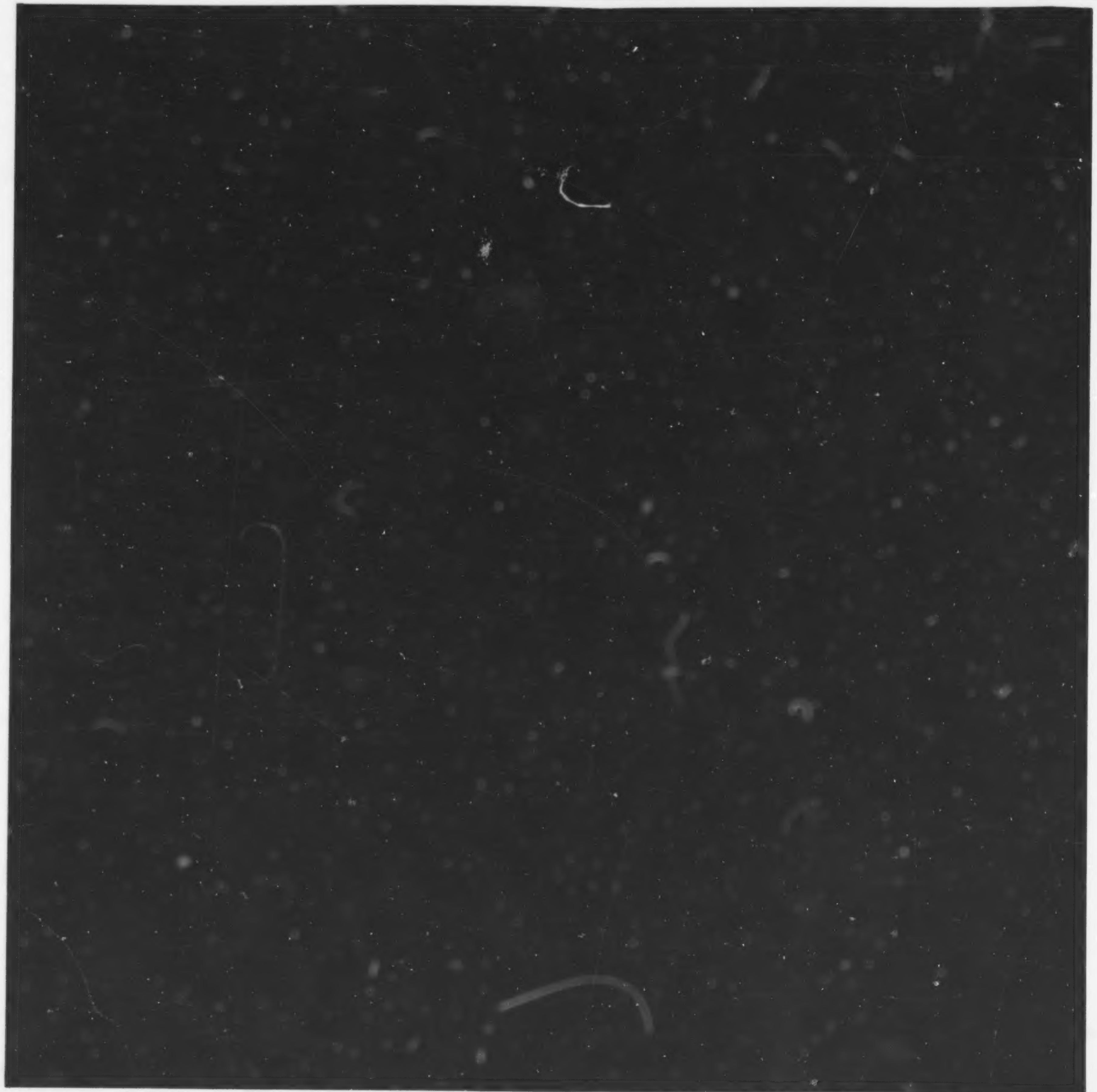
Three deciduous woodlots occur on the site (Figure 3) and collectively occupy approximately 8% of the site area. The dominant overstory species are noted in Section 4.2.2.

Areas of lowland thicket, recently disturbed field, old field and marsh are also present. Approximately 66% of the site is currently in agricultural production.

Seventy-five bird species have been recorded within the acquisition area, 54 of which likely utilize the area for nesting purposes. Fifteen species of mammals, eight species of reptiles and amphibians, and five species of fish have also been recorded from the site.

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated in Section 4.2.2.



OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

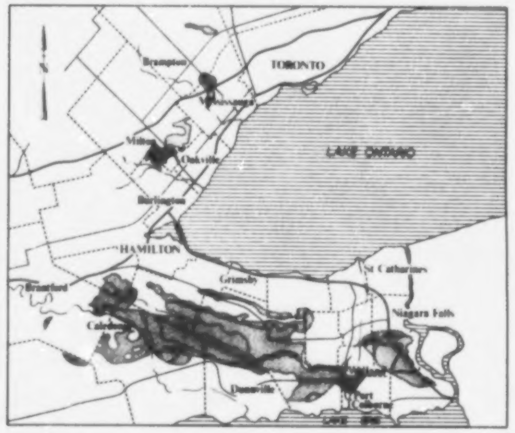
ANIMALS	PLANTS
	Ⓑⓤ Buttonbush
	Ⓢⓐ Swamp Rose
	Ⓗⓑ Highbush Blueberry
	Ⓐⓣ Adder's tongue
	Ⓖⓑ Wild Gooseberry
	Ⓖⓡ Rough Hair Grass
	Ⓜ Marsh St. John's-wort
	Ⓒⓗ Chokeberry

☐ Forestry Potential

▧ Special Vegetation Association/Significant Environmental Unit

━ Phase 3B Acquisition Boundary

Key Map: **LF - 4 North**


N
Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
St Catharines
Grimsby
Brantford
Niagara Falls
Caledonia
Dunnville
Port Colborne
LAKE ERIE

Scale Bar: 500 0 500 / 250 0 250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 **Figure 3**

4.2.1 SPECIES LIST:

A total of 255 plant species has been recorded on Site LF-4N. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Seven natural vegetation associations are present on Site LF-4N. Cropland and unclassified and are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under four major cover type headings:

Forest

The dominant forest cover on the site is upland deciduous, occupying approximately 10 hectares. It occurs with both lowland deciduous and upland mixed forest in two main wooded complexes on the site, in the north-central and south-central areas.

The upland deciduous forest is dominated by White Oak (Quercus alba), Bur Oak (Q. macrocarpa), Red Oak (Q. rubra), Shagbark Hickory (Carya ovata) and White Pine (Pinus strobus).

The lowland deciduous forest (3 hectares) is dominated by Silver Maple (Acer saccharinum).

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE LF-4N

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Deciduous Forest	10
Lowland Deciduous Forest	3
Upland Mixed Forest	1
Lowland Shrub Thicket	<1
Recently Disturbed Field	29
Old Field	6
Marsh	2
Other	
Cropland	110
Unclassified	6
TOTAL	168

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting all other cover type areas from the total site area.

The upland, mixed forest (1 hectare) is dominated by White Pine and White and Red Oaks. The woodlot in the north-central portion of the site is generally immature, dominated by pole-sized material and scattered larger specimens. Evidence of recent logging is present.

The wooded complex in the south end of the site is generally more mature, with larger specimens of oak and pine present.

Thicket

Lowland thicket occupying less than 1 hectare is dominated by Red Osier (Cornus stolonifera) and Narrow-leaved Meadowsweet (Spirea alba). It occurs within an old field complex in the south-central area.

Marsh

Marsh vegetation is found in several small pockets across the site, generally associated with the two wooded complexes already discussed. It occupies 2 hectares.

The dominant robust emergents are Narrow-leaved Cattail (Typha angustifolia) and Common Reed (Phragmites australis). The dominant narrow-leaved and broad-leaved emergents encountered were Wool-grass (Scirpus cyperinus) and Purple Loosestrife (Lythrum salicaria), respectively.

Field

Both old and recently disturbed fields are present on the site. Old field (6 hectares) is associated with the wooded complexes in the north and south-central portions of the site. This cover type is dominated by native herbaceous vegetation (e.g. Canada Goldenrod, Solidago canadensis).

Recently disturbed field, occupying 29 hectares, is concentrated in the southeastern corner of the site. Dominants include Timothy (Phleum pratense), Broad-leaved Plantain (Plantago major) and Dandelion (Taraxacum officinale).

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS:

Special associations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distribution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/ Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

No SEUs occur on Site LF-4N. One special vegetation association is present.

The Regional Municipality of Halton (1978b) reports the presence of a small regionally uncommon vegetation association on the site: a swamp-moss hummock complex (Figure 3).

The feature is dominated by Silver Maple and White Birch (*Betula papyrifera*). These trees, as well as shrub and moss species, are found on hummock formations. At least three regionally rare plant species are known from this particular vegetation association (Regional Municipality of Halton 1978b). These are:

Buttonbush	*Cephalanthus occidentalis*
Swamp Rose	*Rosa palustris*
Highbush Blueberry	*Vaccinium corymbosum*

The latter species was reported by the Regional Municipality of Halton (1978b) as *Vaccinium atrococcum*. This taxon is now considered conspecific with *V. corymbosum* according to Soper and Heimburger (1982).

These vegetation associations, found in wet and wet-mesic habitats, are generally important in Halton Region. They provide habitat to numerous rare and uncommon plant species (Crins, *pers. comm.* 1984a).

An open Bur Oak woods on the site was examined and determined to be "savanna-like", but not a special vegetation association.

4.3 FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Seventy-five bird species, 15 mammal species, eight reptile and amphibian species and five fish species have been recorded on Site LF-4N. Master species lists are presented in Tables 6 through 10.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

Wetland habitat on Site LF-4N is represented by 12 scattered patches of marsh, which collectively occupy 2 ha. Indian Creek, a slow-moving, warm stream, is the only major water course on the site and flows through the extreme southern corner of the site.

Indian Creek provides habitat for aquatic species. It is known to contain at least five species of fish (Regional Municipality of Halton 1980a). The five frog species known from Site LF-4N (Table 8) were recorded from the wet areas situated within the lowland deciduous woodlot which occupies the southwest corner (Regional Municipality of Halton 1980b).

4.3.3 EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Seven natural vegetation cover types occur on Site LF-4N. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site LF-4N cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

Two-thirds of Site LF-4N (112 ha) are currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer, (Odocoileus virginianus) and granivorous birds) as food sources but rarely support nesting birds. Recently disturbed fields (29 ha) may provide suitable breeding habitat for ground-nesting birds such as Upland Sandpipers (Bartramia longicauda) and Grasshopper Sparrows (Ammodramus savannarum). However, this vegetation cover type is most important as terrestrial wildlife habitat in later stages of plant succession. Old field habitat, while poorly represented on Site LF-4N (approximately 6 ha), is a potential breeding area for both ground and shrub-nesting birds such as Eastern Kingbird (Tyrannus tyrannus), Gray Catbird (Dumetella carolinensis), Yellow Warbler (Dendroica petechia), Song Sparrow (Melospiza melodia), and American Goldfinch (Carduelis tristis).

Mammals associated with this habitat type include Woodchuck (Marmota monax) and Eastern Cottontail (Sylvilagus floridanus).

Forests

The interface between field and forest habitats is occupied by "edge" species. Although narrow, the "edge" ecotone typically provides the greatest diversity of vegetation types and thus supports a correspondingly high number of wildlife species (Taylor and Taylor 1979).

The breeding bird community associated with "edge" species on Site LF-4N is an overlapping one, comprised of both field and forest dwellers. Woodlot margins are also favoured by Coyotes, Red Fox (Vulpes vulpes) and deer. Cavities in trees provide den sites for Raccoons (Procyon lotor).

The structure and diversity of the breeding bird community associated with the deciduous forest types on Site LF-4N are strongly influenced by the vertical complexity of the vegetation.

The northwest side contains a second-growth woodlot which has attained an intermediate stage of succession. It is characterized by stands of pole-sized Silver Maples with a moderately dense understory of saplings and shrubs.

The avian niches provided by second-growth woods are typically suited for occupation by insectivores and omnivores (Samson 1979). Most forage on the ground or at a low elevation. Canopy dwellers are probably absent from this immature forest type. Typical breeding birds which may be associated with the upland and lowland deciduous woods on Site LF-4N include Downy Woodpecker (Picoides pubescens), Northern Flicker (Colaptes auratus), American Crow (Corvus brachyrhynchos), Brown Thrasher (Toxostoma rufum), American Robin (Turdus migratorius), Ovenbird (Seiurus aurocapillus) and Yellow Warbler.

The avian niches provided by mature oak forests (10 ha) are primarily suited for occupation by insectivorous canopy dwellers such as Red-eyed Vireos (Vireo olivaceus) and Scarlet Tanagers (*Piranga olivacea*). The absence of shrub cover throughout these mature wooded areas eliminates some ground feeders and understory foliage gleaners.

In contrast to upland deciduous forests, lowland deciduous forests generally contain a greater diversity of tree species but often exhibit a patchier distribution (Solomon 1977). These differences reflect the effects of periodic flooding and shifts in soil texture and layering on forest succession (Bendinger 1971).

Three hectares of Site LF-4N are represented by lowland deciduous forest in a mature stage of succession, dominated by White Oak, Red Oak and White Pine. The avian community associated with this forest type is comprised primarily of insectivores (Samson 1979). Typical breeding species include Red-headed Woodpecker (*Melanerpes erythrocephalus*), Black-capped Chickadee (*Parus atricapillus*), House Wren (*Troglodytes aedon*), White-breasted Nuthatch (*Sitta carolinensis*), Eastern Wood-Pewee (*Contopus virens*), and Warbling Vireo (*Vireo gilvus*).

Thicket

Lowlying wet thickets provide potential nesting habitat for Willow Flycatchers (*Empidonax traillii*), Yellow Warblers, Common Yellowthroats (*Geothlypis trichas*) and Swamp Sparrows (*Melospiza georgiana*).

Marsh

Marsh habitat is dominated by an association of low grasses and sedges which may support nesting Bobolinks (*Dolichonyx* oryzivorus). Red-winged Blackbirds (Agelaius phoeniceus) may nest wherever robust emergents such as cattails occur. Muskrats (Ondatra zibethicus) also favour these wet areas.

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds. No special habitats are known to occur on Site LF-4N.

4.4 RARE SPECIES

4.4.1 INTRODUCTION:

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation These are indicated in Tables 5 through 10 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed elsewhere in Sections 2.2 and 7.1 of this technical appendix and in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology"

To make information presentation more logical, indicators of rare species are not used to divide the discussion. Rather, rare species discussions are organized by life form (animals and plants) and species. Each indicator is addressed within each species discussion.

The approximate locations of rare species occurring on the site are mapped in Figure 3 at an original scale of 1:5,000. The scale of this map has been reduced for reporting purposes. Circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species where, for example, several individuals are found in close proximity to one another. Information concerning actual numbers of individuals of rare species and their on-site distribution is presented later in this section and in Table 2.

However, it should be emphasized that existing rare species data are based on preliminary investigations. Further on-site field work could result in an increase in both the numbers and individuals of rare species.

4.4.2 RARE ANIMAL SPECIES:

None of the animal taxa known to occur on Site LF-4N is considered rare.

4.4.3 RARE PLANT SPECIES:

Relative population sizes and distribution patterns of rare plant species on Site LF-4N were determined from reconnaissance field observations conducted by Gartner Lee Associates Limited (GLAL) and other sources (Regional Municipality of Halton 1978b; Crins 1984, pers. comm. 1984a, 1985; Bird and Hale Limited 1985). Numbers of individuals recorded by GLAL were noted within field study plots. These totals were supplemented by observations made between sampling stations.

Thirteen rare plant species have been recorded on the site. Approximate locations of eight of these species are shown on Figure 3. These are:

Chokeberry	*Aronia melanocarpa*
Swamp Rose	*Rosa palustris*
Highbush Blueberry	*Vaccinium corymbosum*
Buttonbush	*Cephalanthus occidentalis*
Adder's-tongue	*Ophioglossum vulgatum*
Wild Gooseberry	*Ribes hirtellum*
Marsh St. John's-wort	*Triadenum fraseri*
Rough Hair Grass	*Agrostis scabra*

All of these species are rare in the Regional Municipality of Halton (Crins, *pers. comm.* 1984a) and are characteristic of mesic and wet-mesic habitats.

Five rare sedge species have been recorded on the site, for which exact locations are unknown. These are:

Sedge	*Carex amphibola*
Sedge	*C. brunnescens*
Sedge	*C. canescens*
Sedge	*C. grayi*
Sedge	*C. scoparia*

These were reported from the site or adjacent lands (Bird and Hale Limited 1985) and are considered to be regionally rare (Crins, *pers. comm.* 1985).

Chokeberry
This species is recorded from a wet-mesic area in the south-central portion of the site. It is considered rare in Halton Region (Crins 1984, *pers. comm.* 1984a).

Swamp Rose, Highbush Blueberry, Buttonbush

These three species are known from the same station as Chokeberry (Crins, *pers. comm.* 1984a). It is also reported to occur in a "swamp-moss hummock" feature on the site (Regional Municipality of Halton 1978b). This special vegetation association is discussed in Section 4.2.3. All are considered to be rare in Halton Region (Crins 1984, *pers. comm.* 1984a).

Adder's-tongue, Wild Gooseberry, Rough Hair Grass, Marsh St. John's-wort

These species are known from a wet field in the south-central site area (Crins 1984, *pers. comm.* 1984a). All four are considered rare in the Regional Municipality of Halton.

Sedges (*Carex brunnescens*, *C. canescens*, *C. scoparia*)

These sedges have been reported from the natural vegetation complex in the south-central portion of the site (Bird and Hale Limited 1985). Exact locations are unknown, however habitat requirements suggest that all three may occur in the lowland communities identified in Section 4.2.2 of this technical appendix. The record for *Carex brunnescens* is apparently the first in Halton Region (Crins, *pers. comm.* 1985).

Sedges (*Carex amphibola*, *C. grayi*)

These two species have been reported from a wooded complex in the northwest corner of the site. The woods continue off-site, and it is not known whether the sedges occur on or adjacent to the site. In Table 5, both species are listed for the site and site vicinity, however for reporting purposes, the occurrences are considered to involve the site only.

Carex amphibola is generally known from dry soils, while C. grayi is more characteristic of swamps and wet meadows.

Two additional plants which have been reported from Site LF-4N are likely erroneous records and have been discounted as rare species. These are:

Turk's-cap Lily	Lilium superbum
Hairy Honeysuckle	Lonicera hirsuta

Turk's-cap Lily is not known from Halton Region and Hairy Honeysuckle is known from one station in the Region. The identifications are likely incorrect (Crins, pers. comm. 1984a).

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered are: forestry, trapping, hunting and fishing. Resource use has been identified as a biological factor, the rationale for which is provided in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.5.1 FORESTRY:

Forestry potential (Figure 3) refers to wooded areas which could be commercially logged for sawlogs, veneer logs and fuelwood.

On-site assessments of forestry potential were made by GLAL on the basis of the following criteria: size of woodlot, species composition, age and size of trees, accessibility and aspect.

Additional information pertaining to the forestry potential of Site LF-4N was provided by Forest Resource Inventory maps (OMNR 1979a) and questionnaire results.

The potential for commercial forestry is limited primarily to the south-central portion of the site. There, the woods total approximately 11 hectares of upland and lowland deciduous forest. The majority of cover is upland deciduous, dominated by oaks (White, Red and Bur) and White Pine. Some potential exists for sawlog and veneer log production as well as some fuelwood thinning. The lowland deciduous woods dominated by pole-sized Silver Maples, promise little, short-term forestry potential.

The pocket of savanna-like oak woods contains numerous large diameter Bur Oak specimens, likely suited to some sawlog and veneer log production. The open grown nature of those oaks and the resultant heavy branching may limit use of some specimens to fuelwood production.

The interspersion of field, marsh and thicket with the deciduous woods in the south-central complex would limit the effectiveness of forest management programs.

The patch of woods in the north-central portion of the site is small (approximately 3 hectares) and composed of primarily second growth pole and sapling material with very limited current forestry value.

Cutting fuelwood for personal consumption (Bousfield, pers. comm. 1984) is apparently a minor forestry activity on Site LF-4N.

Within a regional context, forestry is not a significant resource use on Site LF-4N.

4.5.2 TRAPPING:

Site LF-4N lies within the trapping area worked by two licensed trappers.

One individual traps in upland areas on either side of Britannia Road in the southeastern portion of the site (Mackie, pers. comm. 1984). In 1983-84, Red Fox, Coyote, Raccoon and Muskrat were harvested along the Britannia Road corridor. The majority of Muskrats captured are associated with Indian Creek. Specific numbers of animals taken from the site itself are not known.

Farm ponds, barns and culverts on both sides of Tremaine Road (northeastern portion of the site) are trapped for Muskrats and Raccoons (Corp, pers. comm. 1984). Specific numbers of animals taken from the site itself are not known.

According to Corp (pers. comm. 1984) the animal catch in this area has remained fairly constant over the past several years. Mackie (pers. comm. 1984), however, contends that trapping yields have declined in recent years and suggests that rabies may be a contributing factor.

4.5.3 HUNTING:

No hunting activity has been reported for Site LF-4N, despite the presence of deer and upland game species. Hunting is not a significant biological resource use on the site.

4.5.4 FISHING:

The major fishing activity associated with Site LF-4N is a commercial baitfishing operation carried out along the upper reaches of Indian Creek (Gaetan, pers. comm. 1984). Although most of the area involved falls outside the site, Indian Creek flows through its extreme southern corner.

Gaetan (pers. comm. 1984) estimates that in 1983 approximately 250 to 300 dozen fish were taken from Indian Creek. The major species involved are Emerald Shiner (*Notropis atherinoides*), Creek Chub (*Semotilus atromaculatus*), White Sucker (*Catostomus commersoni*) and Central Mudminnow (*Umbra limi*).

Although no statistics are available, angling activity along Indian Creek is probably light. Indian Creek is a warm water stream and supports a population of Smallmouth Bass (*Micropterus dolomieui*) downstream of Site LF-4N. Although the Ontario Ministry of Natural Resources have no records of salmonids being captured in Indian Creek (OMNR 1981), a single Brook Trout (*Salvelinus fontinalis*), suspected of being of hatchery origin, was collected on Site LF-4N on 30 November 1979 (Regional Municipality of Halton 1980a).

4.6 SUMMARY-SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to present the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 2 Summary Site Biological Resources LF-4 N

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURCE USE			
NAME	NO. OF INDIVID.	DISTRIBUTION	SPECIES LIST	AQUATIC HABITAT	TERR.WILD HABITAT	SPECIAL HABITATS	SPECIES LIST	AREA NAT. VEGETATION	NO. OF COVER TYPES	SPECIAL ASSOC./SEU	FORESTRY	TRAPPING	HUNTING	FISHING
● Choke-berry	unknown; these species reported but not confirmed by GLAL	Natural vegetation complex-south half of site	● 75 birds ● 15 mammals ● 8 reptile and amphibian species ● 5 fish species	● Indian Creek	● 7 natural vegetation cover types ● 14 ha of forest ● some thicket, marsh, recently disturbed field, and old field habitat ● habitat for forest, edge, field, and wetland communities	● None	265 plant species	● Upland Deciduous Forest 10 ha ● Lowland Deciduous Forest 3 ha ● Mixed Upland Forest 1 ha ● Lowland shrub thicket <1 ha ● Recently Disturbed Field 29 ha ● Old Field 6 ha ● Marsh 2 ha	● 7 Natural vegetation cover types - see list to left	-"swamp-moss-hummock complex"	● some firewood extraction ● lowland deciduous forest capable of producing hardwoods for industry according to OMNR ● also some upland areas with saw-log potential	● muskrat, raccoon trapping on site ● 2 licenced trappers	● none reported	● commercial bait-fishing operation in Indian Creek
● Swamp Rose		"												
● High-bush Blue-berry	"	"												
● Button-bush	"	"												
● Wild Goose-berry	"	"												
● Adder's-tongue	"	"												
● Marsh St. John's-wort	"	"												
● Rough Hair Grass	"	"												
● Carex amphibola	"	northwest corner of site in woods; or on adjacent land												
● C. grayi	"	"												
● C. brunnescens	"	probably occur in south-central wooded complex												
● C. cannescens	"	"												
● C. scoparia	"	"												

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

5.1 INTRODUCTION

Site vicinity is defined as the area which lies outside Site LF-4N within approximately a 2.0 km radius of the acquisition boundary. The LF-4N site vicinity boundary is delineated in Figure 4 and referred to as "Site Vicinity Study Area Boundary".

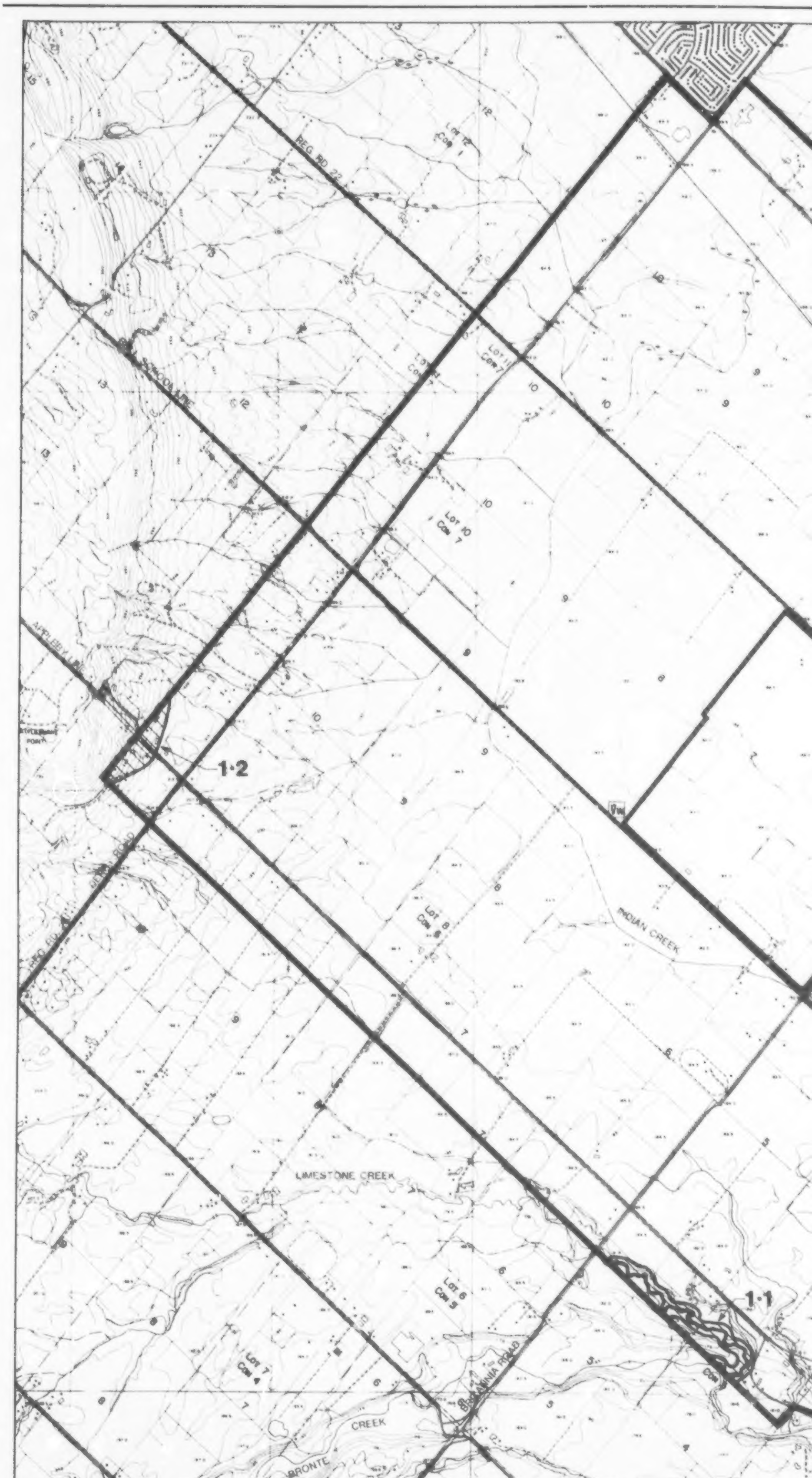
A total of 79 plant species has been recorded in the site vicinity (Table 5). Sixty-seven of the 92 bird species known from the site vicinity are permanent or summer residents which possibly breed in the area (Ontario Breeding Bird Atlas 1984; Table 6). An additional ten species of mammals, one species of reptile, 17 species of fish and one species of butterfly are reported to occur in the site vicinity (Tables 7 through 10 respectively).

In general, the pattern of vegetation cover types found throughout the site vicinity is similar to that which exists on the site itself.

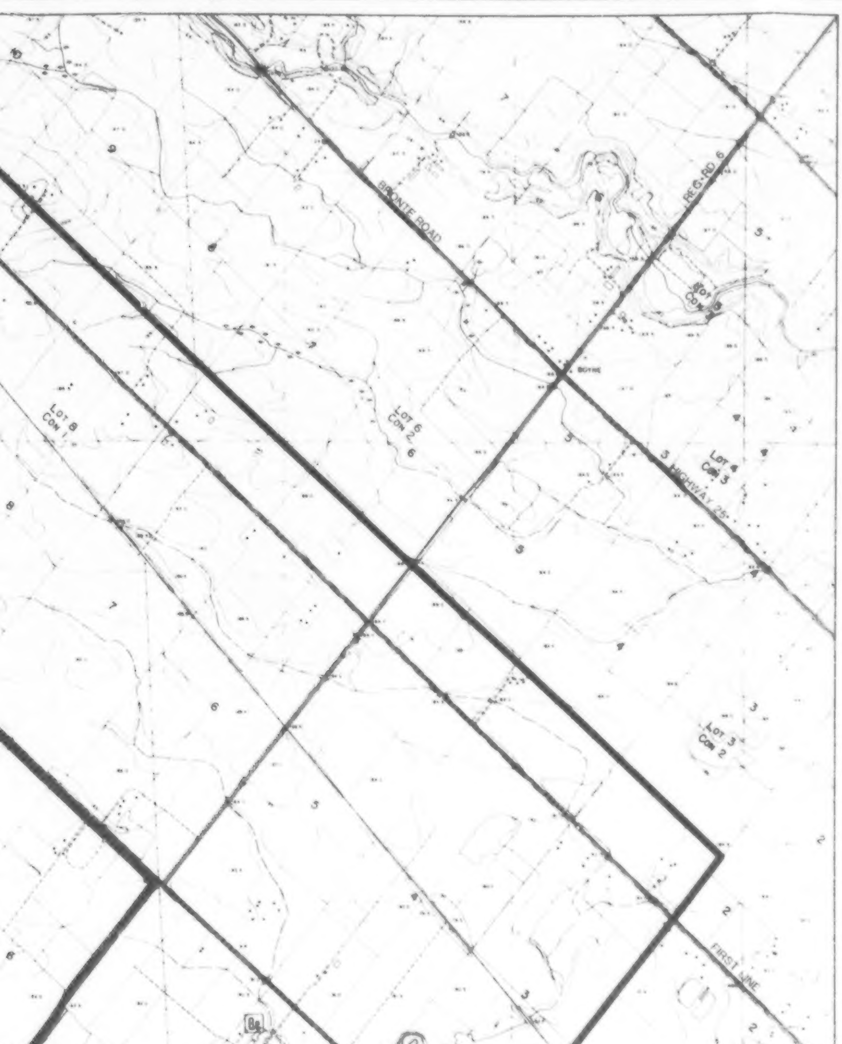
Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations and rare species.

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas



REG. RD. 22
Lot 12 Con 1
SCHOOL LINE
Lot 11 Con 7
Lot 10 Con 7
APPLEBY LINE
1·2
REG. RD.
Lot 8 Con 6
INDIAN CREEK
LIMESTONE CREEK
Lot 6 Con 5
Lot 7 Con 4
BRITANNIA ROAD
BRONTE CREEK
1·1


BRONTE ROAD
REG. RD. 6
HIGHWAY 25
FIRST LINE
DERRY ROAD
LOWER BASE LINE
LOT 8 CON 1
LOT 6 CON 2
LOT 4 CON 3
LOT 3 CON 2
LOT 1 CON 1
LOT 1 CON 2N
LOT 1 CON 7
LOT 2 CON 8
Be
Town of Milton
City of Burlington

Contour Interval in Metres

1:10 000 base mapping produced by Surveys and Mapping Branch, Ministry of Natural Resources between 1976 and 1984

OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS

Be Eastern Bluebird

Vw West Virginia White

PLANTS

Significant Environmental Units

▨ ESAs, ANSIs and AIBRs

13·3 Unit number
Candidate area number

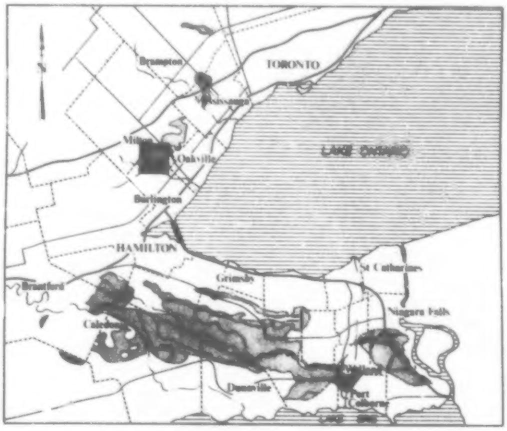
Significant Fish and Wildlife Features

〰 Salmonid Spawning Nursery Area

— Phase 3B Acquisition Boundary
━ Site Vicinity Study Area Boundary

Key Map: **LF-4 North**

Lots 6 and 7; Concession VII; Town of Milton, formerly in the Township of Nelson


N
Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
Brantford
Grimsby
St Catharines
Niagara Falls
Caledonia
Dunnville
Welland
Port Colborne
LAKE ERIE

1000 feet 0 1000
500 metres 0 500

EXISTING BIOLOGICAL CONDITIONS, PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

September 1985 FIGURE 4

(ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definitions of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Portions of two SEUs occur within the LF-4N site vicinity (Figure 4). Areas of the two natural vegetation cover types represented in SEUs are noted in Table 3.

Bronte Creek (SEU 1-1) flows through the southwesternmost portion of the site vicinity. It is situated 1.75 km from the site at its closest point. The portion of Limestone Creek upstream of its confluence with Bronte Creek represents a Brook Trout, Brown Trout (Salmo trutta) and Rainbow Trout (Salmo gairdneri) migratory route to spawning and nursery areas (OMNR 1984a). The section of Bronte Creek upstream of its confluence with Limestone Creek is an important cold water fishery which contains Coho Salmon (Oncorhynchus kisutch), Chinook Salmon (O. tshawytscha) and Rainbow Trout spawning and nursery areas (OMNR 1984a). Bronte Creek is considered to be an AIBR due to the presence of these features (OMNR 1983a).

Both Bronte Creek and Limestone Creek support salmonid spawning and nursery areas (OMNR undated a, 1981). Although exact population data are not known, these spawning areas support Coho and Chinook Salmon, and Brook, Brown and

TABLE 3: AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, LF-4N

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
SEU	
Deciduous Forest	1
Coniferous Forest	<1
Other	
Deciduous Forest	109
Mixed Forest	15
Coniferous Forest	<1
Wetland	<1
Successional Field	10
TOTAL	138

* Areas are approximate and are rounded to whole numbers.

Rainbow Trout (OMNR 1984a). The Bronte Creek watershed has been identified as an important fisheries resource area (OMNR 1983a).

Crawford Lake-Rattlesnake Point Escarpment Woods (SEU 1-2) is recognized as an ESA (Regional Municipaltiy of Halton 1978a), an ANSI (OMNR 1983b) and an AIBR (OMNR 1983a). A small portion of this SEU occupies the westernmost edge of the LF-4N site vicinity and, at its closest point, is situated 2.25 km from the site.

Crawford Lake-Rattlesnake Point Escarpment Woods satisfies seven of the ESA criteria established by the Regional Municipality of Halton (1978a). The area contains a meromictic lake, is a headwater of the Twelve Mile Creek, contains several significant plant communities, supports rare plant species, possesses a high diversity of biological communities associated with geomorphological features, is suited to scientific research and conservation education, and has high aesthetic value.

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

Waterfowl Staging Areas

According to a site vicinity resident (DaSilva, *pers. comm.* 1984), "thousands" of Canada Geese (*Branta canadensis*) and ducks congregate on a pond along Indian Creek (Figure 4). Although not explicitly stated, this large number of geese presumably refers to staging during fall migration.

The significance of this waterfowl staging area in a regional context cannot be determined at this time. No portion of Indian Creek is identified as a waterfowl staging area by the OMNR (undated a).

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within that portion of the site vicinity which is not designated as SEU. Five natural vegetation associations are represented. The approximate area of each vegetation association is indicated in Table 3. Some appear to have similar structure and composition to those areas studied on Site LF-4N.

Forest

A mix of deciduous, coniferous and mixed forest is present in the site vicinity. The deciduous woods represent the largest component of natural vegetation, covering approximately 109 hectares.

The woods are fragmented and widely scattered blocks, varying in size from less than one hectare to about 20 hectares in size.

Small coniferous plantations (less than 1 hectare) and scattered pockets of mixed woods (15 hectares) occur in the vicinity.

Wetland
One small wetland pocket (less than one hectare) is located just northeast of the site.

Successional Field
Seven blocks of successional field totalling 10 hectares are scattered throughout the vicinity.

5.5 RARE SPECIES

Where known, the approximate locations of rare species occurring in the site vicinity are mapped in Figure 4 at a scale of 1:10,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. For information concerning actual numbers of individuals of rare species and their site vicinity distribution, the reader is referred to the accompanying text of Section 5.5.

5.5.1 RARE ANIMAL SPECIES:

Two rare birds and one rare butterfly have been reported in the LF-4N site vicinity.

Red-shouldered Hawk (*Buteo lineatus*)
According to preliminary results of the Ontario Breeding Bird Atlas project (OBBA 1984), this species is listed as a "possible" breeder in the 10 km square unit (square 17-NV-91) which encompasses the LF-4N site vicinity. The specific location of this sighting within square 17-NV-91 is not known and may fall outside the site vicinity boundary.

Since the early 1960's, the Red-shouldered Hawk population in the Central Region of Ontario (including Halton R.M.) has experienced "a drastic decline" (Risley 1982).

In the event that nesting by Red-shouldered Hawks is confirmed on, or in the vicinity of Site LF-4N, this species should be considered rare on a regional level. However for nesting purposes, Red-shouldered Hawks prefer large tracts of moist riparian woodland (Risley 1982), a habitat type which is absent from the LF-4N site vicinity.

Eastern Bluebird (Sialia sialis)
Bluebirds have been reported from a property situated approximately 1.0 km east of Site LF-4N (Snow, pers. comm. 1984; Figure 4). This observation may involve migrant individuals, however, as evidence of breeding is presently lacking.

Throughout much of its range, the Eastern Bluebird has experienced a pronounced population decline in recent years (Tate and Tate 1982). The species was recently added to the list of rare Canadian taxa by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Muir 1984).

As of 1983, no breeding evidence for the Eastern Bluebird was recorded in any of the 10 km square units containing or adjacent to Site LF-4N (Ontario Breeding Bird Atlas 1984). If future breeding is confirmed on Site LF-4N, this species should be considered regionally rare.

West Virginia White (Artogeia virginiensis)
In Ontario this butterfly is officially "Endangered" (OMNR 1977) and is protected by law (Ontario Government 1971). In Halton R.M. the species is confined to rich deciduous woods above the Niagara Escarpment which support the larval foodplant, Toothwort (Dentaria diphylla). Although West Virginia Whites may wander several miles from Dentaria stands, the butterflies invariably remain in wooded areas (Brownell 1981). It is almost never observed in the open field habitat favoured by its two close relatives, the Mustard White (Artogeia napi) and the European Cabbage Butterfly (A. rapae) (Forbes 1960; Wagner 1978). Despite a great deal of recent investigation into the habits and ecology of this species in Halton R.M., the presence of the West Virginia White has apparently never been confirmed below the Niagara Escarpment (Brownell 1981; Hess 1981; Coulson, pers. comm. 1984).

Several small white butterfies believed to be Artogeia virginiensis were reported from an open weedy field adjacent to Site LF-4N (Figure 4) in the summer of 1984 (Patrick, pers. comm. 1984). Based on the above information this report is probably erroneous. Superficially, West Virginia Whites bear a very close resemblance to the more common Mustard White and butterflies on the wing may easily be misidentified. This problem is compounded by the fact that adults of both species emerge in late April and early May (Voss and Wagner 1956).

5.5.2 RARE PLANT SPECIES:

No rare plant species are known from the LF-4N site vicinity.

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information, as summarized in Table 4, provides background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources LF-4 N

FACTORS AND INDICATORS

	SIGNIFICANT ENVIRONMENTAL UNITS		FISH AND WILDLIFE FEATURES OF SIGNIFICANCE		OTHER NATURAL VEGETATION	RARE SPECIES
	SEU	DISTANCE TO SITE	FEATURES	DISTANCE TO SITE		
EXISTING SITE VICINITY CONDITIONS	• 1-1 • Bronte Creek • AIBR	1.75 km	• Waterfowl Staging Area - Pond on Indian Creek	1.25 km	• Deciduous Forest 109 ha • Coniferous Forest <1 ha • Mixed Forest 15 ha • Successional Field 10 ha • Wetland <1 ha	Animals • Red-shouldered Hawk • Eastern Bluebird • West Virginia White
	• 1-2 • Crawford Lake - Rattlesnake Point Escarpment Woods • Halton R.M. ESA Study; ANSI, AIBR	2.25 km				

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7.0 SPECIES LIST

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 10) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins et al. 1982), fish (Scott and Crossman 1973), and butterflies (Miller and Brown 1981).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 10. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined; these are sources 21, 30, 31 and 46.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", "Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

A regional perspective was obtained from several sources.

An Environmentally Sensitive Areas (ESA) study for Halton Region conducted in 1978 (Regional Municipality of Halton 1978a), addresses the rare plant species in the region. Subsequent works by the Regional Municipality of Halton (1979, 1980c), produced in conjunction with the Royal Botanical Gardens, provide updated species lists for designated ESAs in Halton Region and some discussion of rarity.

The Halton Region Conservation Authority (1979) produced a report entitled A Biological Inventory of Halton Region Conservation Authority Properties which contains a discussion of rare flora.

Sutherland (1981) has compiled A Provisional List of the Rare Vascular Plants of the Regional Municipality of Halton. This document was referred to for background information on plant status and distribution.

The most current source of information concerning plant status and distribution in Halton Region is a working file maintained by W.J. Crins at the Erindale Herbarium (University of Toronto). The file contains data concerning all plant collections made in the region to date. It is thought to accurately represent the regional status of plants (Crins, pers. comm. 1984a). Rare species are those for which there are five stations or fewer in Halton Region.

Material referred to for status information outside, but adjacent to, the Regional Municipality of Halton included The Vascular Plant Flora of Peel County (Webber 1984) and the ESA study prepared for the Regional Municipality of Hamilton-Wentworth (Ecologistics Ltd. 1976).

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reorts where applicable.

Frequency and realtive abundance standards are assigned to Ontario birds by James *et al*. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for a comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

The only published account of the birds of Halton Region is provided by Brooks (1906). This cursory treatment is now badly outdated. Subsequent investigations have apparently not been carried out on a regional level.

In the absence of any recent published data, the statuses which have been applied to various birds in Halton R.M. largely reflect the opinions of local experts and are thus purely subjective. References to "Significant" Halton species are contained in several recent reports (Regional Municipality of Halton 1978a; Halton Region Conservation Authority 1979).

More recent information on the status of breeding birds in Halton Region was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April 1984, 20 species of mammals are designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not addressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammalian fauna of the Regional Municipality of Halton. Information supplied by local naturalists and recognized authorities in the field of mammalogy was largely relied upon to determine the regional status of particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and

South Wellington Counties was also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from what was formerly Halton County; however, they do not assign status. A survey of the amphibians and reptiles of the Niagara Escarpment Planning Area (Campbell 1976) also includes references to Halton. The significance of several Halton herptiles is briefly addressed by the Halton Region Conservation Authority (1979).

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister et al. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species is presently protected in Ontario by "Endangered" species legislation. The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disproportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitive definitions of rarity could be proposed with a considerable degree of confidence. However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists. For many of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present

status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of Guelph, and the National Museum of Natural Sciences in Ottawa, were consulted on a number of occasions.

In cases where wildlife data were lacking, lengthy discussions were held with appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE LF-4N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
EQUISETACEAE	HORSETAIL FAMILY		
Equisetum arvense L.	Field Horsetail	20,12, 45	
E. sylvaticum L.	Wood Horsetail	45	
OPHIOGLOSSACEAE	ADDER'S-TONGUE FAMILY		
Ophioglossum vulgatum L. *	Adder's-tongue	4,10, 12,14, 20	
OSMUNDACEAE	ROYAL FERN FAMILY		
Osmunda cinnamomea L.	Cinnamon Fern	20,16, 12,	
ASPLENIACEAE	SPLEENWORT FAMILY		
Matteuccia struthiopteris (L.) Todaro	Ostrich Fern	45	
Onoclea sensibilis L.	Sensitive Fern	31,20, 16,13, 12,45	
Camptosorus rhizophyllus (L.) Link	Walking-fern		18
Cystopteris bulbifera L. Bernh.	Bulblet Fern	13	
Dryopteris goldiana (Hook.) A. Gray.	Goldie's Fern		18
D. spinulosa (Muell.) Kuntze	Spinulose Shield-fern	20,12	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
THELYPTERIDACEAE	BEECH FERN FAMILY		
Thelypteris palustris (Salisb.) Schott	Marsh Fern	20,16, 12,45	
PINACEAE	PINE FAMILY		
Pinus strobus L.	White Pine	20,17, 13,12, 31,45, 46	11,21,45
Larix laricina (Du Roi) K. Koch	Tamarack	12,16, 17,20	
Tsuga canadensis (L.) Carr.	Eastern Hemlock	20,12	18
TYPHACEAE	CATTAIL FAMILY		
Typha angustifolia L.	Narrow-leaved Cattail	31,13	
T. latifolia L.	Cattail	20,10, 13,12	
SPARGANIACEAE	BUR-REED FAMILY		
Sparganium eurycarpum Engelm.	Giant Bur-reed	20,16, 13,12	
ALISMATACEAE	WATER-PLANTAIN FAMILY		
Alisma plantago-aquatica L.	Water-plantain	31,20, 16,12	
Alisma subcordatum Raf.	Water-plantain	13	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
POACEAE	GRASS FAMILY		
Bromus inermis Leyss.	Smooth Brome Grass	45	45
Festuca pratensis Huds.	Meadow Fescue	20	
Glyceria borealis (Nash) Batchelder	Northern Manna Grass	12,20	
G. maxima (Hartman) Holmberg	Sweet Reed Grass	45,12	
G. septentrionalis A.S. Hitchc.	Eastern Manna Grass	16,12, 20	
G. striata (Lam.) A.S. Hitchc.	Fowl Manna Grass	20,12, 45	45
Poa compressa L.	Canada Blue Grass	20,12	
P. pratensis L.	Kentucky Blue Grass	20,12	
Dactylis glomerata L.	Orchard Grass	31	
Phragmites australis (Cav.) Trin. ex Steudel	Common Reed	31	
Hordeum jubatum L.	Foxtail Barley	20,12	
Sphenopholis intermedia (Rydb.) Rydb.	Slender Wedge Grass	20,12	
Avena sativa L.	Oats	20	
Dathonia spicata (L.) Beauv.	Poverty Oat Grass	20,12	
Calamagrostis canadensis (Michx.) Beauv.	Canada Blue-joint	45	
Agrostis gigantea Roth	Redtop	16	
A. hyemalis (Walt.) B.S.P.	Hair-grass	12	
A. scabra Willd. *	Rough Hair Grass	20,14	
A. stolonifera L.	Creeping Bent Grass	12,20, 45	45
Alopecurus aequalis Sobol	Short Awn Foxtail	16	
Phleum pratense L.	Timothy	20,31 45	45
Oryzopsis asperifolia Michx.	Rough-leaved Mountain Rice	45	
Phalaris arundinacea L.	Reed Canary Grass	45,16	
Leersia oryzoides (L.) Sw.	Rice Cut Grass	16	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CYPERACEAE	SEDGE FAMILY		
Scirpus atrovirens Willd.	Black Bulrush	20,16, 13,12	
S. cyperinus (L.) Kunth.	Wool-grass	31,20, 16,12	
S. validus Vahl.	Common Great Bulrush	20,16, 12	
Eleocharis erythropoda	Spike-rush	45	45
E. obtusa (Willd.) Schult.	Blunt Spike-rush	45,20, 16,12	45
Carex *alburnina* Sheldon.	Sedge	12,20	
C. alopecoidea Tuckerm.	Sedge	45	45
C. amphibola Steud.*	Sedge	45	45
C. arctata Boott.	Sedge	45	
C. aurea Nutt.	Sedge	45	
C. blanda Dewey.	Sedge	45,12, 20	45
C. brunnescens (Pers.) Poir*	Sedge	45	
C. canescens L.*	Sedge	45	
C. comosa Boott.	Sedge	20,16, 12	
C. cristatella Britt.	Sedge	45,20, 12	45
C. gracillima Schw.	Sedge	45,20, 12	45
C. grayi Carey*	Sedge	45	45
C. lacustris Willd.	Sedge	45,20, 12	
C. laxiculmis Schwein	Sedge	12,10, 20	
C. lupulina Muhl. ex Willd.	Sedge	45,20, 12	45
C. molesta Mack.	Sedge	45,12, 20	45
C. pensylvanica Lam.	Sedge	45,20, 12	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
C. plantaginea Lam.	Sedge	31	
C. projecta Mackenzie	Sedge	45	
C. pseudo-cyperus L.	Sedge	45	
C. retrorsa Schwein	Sedge	45,12, 16,20	45
C. rosea Schk.	Sedge	45,12, 20	45
C. *scoparia* Muhl. ex. Willd.*	Sedge	45	
C. sparganoides Muhl.	Sedge	45,12, 20	45
C. spicta Huds.	Sedge	45,12, 20	45
C. stipata Muhl.	Sedge	12,20	
C. tenera Dewey.	Sedge	45,12, 20	45
C. tribuloides Wahl.	Sedge	45	
C. tuckermannii Dewey.	Sedge	45,12, 20	45
C. vulpinoidea Michx.	Sedge	45,16, 20	45
ARACEAE	ARUM FAMILY		
Calla palustris L.	Wild Calla	20,16, 13,12	
PONTEDERIACEAE	PICKEREL-WEED FAMILY		
Pontederia cordata L.	Pickerel-weed	13	
LEMNACEAE	DUCKWEED FAMILY		
Lemna minor L.	Common Duckweed	45,31	
L. trisulca L.	Star Duckweed	45	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
JUNCACEAE	RUSH FAMILY		
Juncus *bufonius* L.	Toad Rush	45,12, 20	
J. *dudleyi* Wiegand	Dudley's Rush	12,20	
J. *effusus* L.	Soft Rush	20,16, 12,45	45
J. *tennuis* Willd.	Path Rush	20,13, 12,45	45
Luzula *acuminata* Raf.	Wood Rush	45	
LILIACEAE	LILY FAMILY		
Trillium *erectum* L.	Red Trillium	45	
T. *grandiflorum* (Michx.) Salisb.	Large-flowered Trillium	45,12, 20	
Lilium *canadense* var. *michiganense* Farw.	Michigan Lily	20,13, 12	
L. *superbum* L.	Turk's-cap Lily	13	
Smilacena *racemosa* (L.) Desf.	False Solomon's Seal	45	
Maianthemum *canadense* Desf.	Wild Lily-of-the-valley	45,20, 13,12, 16	
Smilax *herbacea* L.	Carrionflower	45,20, 12	*21*
ORCHIDACEAE	ORCHID FAMILY		
Epipactis *helleborine* (L.) Crantz.	Helleborine	20,13, 12	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
SALICACEAE	WILLOW FAMILY		
Populus balsamifera L.	Balsam Poplar	17,45	45
P. grandidentata Michx.	Large-toothed Aspen	20,13, 12,45	
P. tremuloides Michx.	Trembling Aspen	45,20, 17,13, 12	45
Salix discolor Muhl.	Pussy Willow	45,20, 12	45
S. nigra Marsh.	Black Willow	17	
S. petiolaris J.E.Sm.	Slender Willow	45,12, 20	45
JUGLANDACEAE	WALNUT FAMILY		
Juglans nigra L.	Black Walnut	19	
Carya cordiformis (Wang.) K. Koch	Bitternut Hickory	20	8
C. ovata (Mill.) K. Koch	Shagbark Hickory	17,13, 12,31, 45	21,45
BETULACEAE	BIRCH FAMILY		
Carpinus caroliniana Walt.	Blue Beech	17,45	21
Ostrya virginiana (Mill.) K. Koch.	Hop Hornbeam	31,20, 17,13, 12,45	11,21, 45
Betula allegheniensis Britt.	Yellow Birch	17,45	
B. papyrifera Marsh.	Paper Birch	31,17, 16,13, 12,20 45	11,45

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	VICINITY
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech	20,17, 12,45	11,45
Quercus alba L.	White Oak	31,20, 17,12, 45	11,21, 45
Q. macrocarpa Michx.	Bur Oak	31,20, 17,15, 13,12, 45	45
Q. rubra L.	Red Oak	31,20, 17,16, 13,12 45	21
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	31,17, 13	
U. rubra Muhl.	Slippery Elm	20,12	
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex crispus L.	Curled Dock	20,16, 13	
Polygonum aviculare L.	Knot-grass	20,12	
P. hydropiperoides Michx.	Mild Water Pepper	12,20	
P. persicaria L.	Lady's Thumb	20	
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium album L.	Lamb's-quarters	20,12	
Atriplex patula L.	Spreading Atriplex	12,20	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
CARYOPHYLLACEAE	PINK FAMILY		
Stellaria graminea L.	Grass-leaved Stitchwort	45	45
S. longifolia Willd.	Chickweed	13	
Cerastium vulgatum L.	Mouse-eared Chickweed	45,20, 12	
Dianthus armeria L.	Deptford Pink	13,20	
RANUNCULACEAE	BUTTERCUP FAMILY		
Ranunculus abortivus L.	Kidney-leaved Buttercup	20,12	
R. acris L.	Tall Buttercup	20,13	
R. scleratus L.	Celery-leaved Buttercup	20,12	
BERBERIDACEAE	BARBERRY FAMILY		
Podophyllum peltatum L.	May-apple	20,13 12	
PAPAVERACEAE	POPPY FAMILY		
Sanguinaria canadensis L.	Bloodroot	12,20	
BRASSICACEAE	MUSTARD FAMILY		
Lepidium campestre (L.) R.Br.	Field Pepper-grass	12,20	
CRASSULACEAE	SEDUM FAMILY		
Penthorum sedoides L.	Ditch-stonecrop	16	
GROSSULARIACEAE	GOOSEBERRY FAMILY		
Ribes cynosbati L.	Pasture Gooseberry	20,12	
R. sativum Syme.	European Red Currant	20,12	
R. hirtellum Michx. *	Wild Gooseberry	4,10, 12,13 14,20	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	VICINITY
ROSACEAE	ROSE FAMILY		
Spirea alba Du Roi	Narrow-leaved Meadowsweet	31,17, 13,12, 16,20, 45	
Pyrus communis L.	Pear	45	45
Malus domestica Borkh.	Apple	20,12	
Amelanchier stolonifera Wieg.	Serviceberry	16	
Aronia melanocarpa * (Michx.) Ell.	Chokeberry	20,14, 12	
Crataegus monogyna Jacq.	English Hawthorn	45	45
C. punctata Jacq.	Hawthorn	45	
Rubus allegheniensis Porter	Common Blackberry	31,13	
R. idaeus L. var. strigosus (Michx.) Maxim.	Wild Red Raspberry	31,12, 13,20, 45	45
R. occidentalis L.	Black Raspberry	45,20, 12,13	45
R. pubescens Raf.	Dwarf Raspberry	16	
Fragaria vesca L.	Wood Strawberry	13	
F. virginiana Dene.	Strawberry	31,13	
Potentilla norvegica L.	Rough Cinquefoil	20,13, 12	
P. recta L.	Sulphur Cinquefoil	20,13, 12	
Waldsteinia fragaroides (Michx.) Tratt.	Barren Strawberry	12,13, 20	
Geum allepicum Jacq. var. strictum (Ait.) Fern.	Yellow Avens	20,13, 12	
G. canadense Jacq.	Avens	20,12	
G. laciniatum Murr.	Avens	13,16	
Agrimonia gryposepala Wallr.	Agrimony	20,12	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	VICINITY
Rosa palustris Marsh. *	Swamp Rose	20,17, 14,13, 12,16, 45	
Prunus virginiana L.	Choke Cherry	13	
FABACEAE	PEA FAMILY		
Medicago lupulina L.	Black Medic	20,13, 45	45
M. sativa L.	Alfalfa	13	
Melilotus alba Desr.	White Sweet-clover	13	
M. officinalis (L.) Lam.	Yellow Sweet-clover	20,12	
Trifolium agrarium L.	Hop-clover	12,13, 20	
T. hybridum L.	Alsike Clover	13	
T. pratense L.	Red Clover	20,13, 12,45	
T. procumbens L.	Smaller Hop-clover	13	
Lotus corniculatus L.	Bird's-foot Trefoil	20,13	
Vicia cracca L.	Cow Vetch	20,13	
GERANIACEAE	GERANIUM FAMILY		
Geranium maculatum L.	Wild Geranium	20,13, 12	
G. robertianum L.	Herb-robert	20,13, 12	
OXALIDACEAE	WOOD-SORREL FAMILY		
Oxalis stricta L.	European Wood Sorrel	13	
ANACARDIACEAE	CASHEW FAMILY		
Rhus radicans L.	Poison Ivy	13	
AQUIFOLIACEAE	HOLLY FAMILY		
Ilex verticillata (L.) Gray	Winterberry	20,17, 16,13, 12	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ACERACEAE	MAPLE FAMILY		
Acer rubrum L.	Red Maple	20,17, 16,13, 12,45	45
A. saccharinum L.	Silver Maple	31,20, 17,16, 10,13, 12,45	21,45
A. saccharum Marsh.	Sugar Maple	17,45	21
BALSAMINACEAE	JEWEL-WEED FAMILY		
Impatiens biflora Walt.	Spotted Jewelweed	20,13, 12,45	
VITACEAE	GRAPE FAMILY		
Vitis riparia Michx.	Wild Grape	17,45	45
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	17	11
HYPERICACEAE	ST.JOHN'S-WORT FAMILY		
Hypericum perforatum L.	Common St. John's-wort	13,45	45
Triadenum fraseri (Spach.) Gl.*	Marsh St. John's-wort	12,14, 16,20	
VIOLACEAE	VIOLET FAMILY		
Viola pubescens Ait.	Downy Yellow Violet	20,12	
LYTHRACEAE	LOOSESTRIFE FAMILY		
Lythrum salicaria L.	Purple Loosestrife	31,16, 10,13, 12,20, 45	45

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ONAGRACEAE	EVENING-PRIMROSE FAMILY		
Epilobium leptophyllum Raf.	Willowherb	16	
Oenothera biennis L.	Hairy Yellow Evening-primrose	31	
Circaea quadrisulcata (Maxim.) Franch. & Sav.	Enchanter's Nightshade	20,13, 12,45	21,45
ADIACEAE	CARROT FAMILY		
Sanicula marlandica L.	Black Snakeroot	20,13, 12,45	21,45
Cicuta bulbifera L.	Bulbous Water-hemlock	20,16, 12	
Sium suave Walt.	Water-parsnip	20,16, 13,12, 45	
Daucus carota L.	Wild Carrot	31,20, 13	21
CORNACEAE	DOGWOOD FAMILY		
Cornus racemosa Lam.	Gray Dogwood	31,13	21
C. stolonifera Michx.	Red Osier	31,12, 13,16, 20	
ERICACEAE	HEATH FAMILY		
Gaultheria procumbens L.	Wintergreen	20,12	
Vaccinium angustifolium Ait.	Low Sweet Blueberry	17,16, 13,12, 20,45	
V. corymbosum L.*	Highbush Blueberry	20,14, 13,12, 16,17, 45	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
PRIMULACEAE	PRIMROSE FAMILY		
Trientalis borealis Raf.	Star-flower	20,16, 13,12	
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash	20,17, 13,12, 45	11,21, 45
F. nigra Marsh.	Black Ash		21
F. pennsylvanica Marsh.	Red Ash	13,45	45
ASCLEPIADACEAE	MILKWEED FAMILY		
Asclepias incarnata L.	Swamp Milkweed	31,20, 16,13, 12,45	45
HYDROPHYLLACEAE	WATERLEAF FAMILY		
Hydrophyllum virginianum L.	Virginia Waterleaf		21
BORAGINACEAE	BORAGE FAMILY		
Myosotis laxa Lehm.	Forget-me-not	20,13, 12	
Echium vulgare L.	Viper's Bugloss	13	
VERBENIACEAE	VERVAIN FAMILY		
Verbena hastata L.	Blue Vervain	31,16	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LAMIACEAE	MINT FAMILY		
Glechoma hederacea L.	Ground Ivy		21
Prunella vulgaris L.	Heal-all	31,20, 13,12	
Satureja vulgaris (L.) Fritsch.	Wild Basil	13	
Lycopus americanus Muhl.	American Water-horehound	16,31, 45	45
L. uniflorus Michx.	Water-horehound	20,16, 12,45	
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum dulcamara L.	Climbing Nightshade	16,13, 12,31, 45	
SCROPHULARIACEAE	FIGWORT FAMILY		
Linaria vulgaris Mill.	Yellow Toadflax	20,12	
Veronica officinalis L.	Common Speedwell	20,12, 13	
Melampyrum lineare Lam.	Narrow-leaved Cow-wheat	12,13, 20	
PLANTAGINACEAE	PLANTAIN FAMILY		
Plantago major L.	Broad-leaved Plantain	31,12, 20,13	21
P. rugelii Dcne.	Rugel's Plantain	13	
RUBIACEAE	MADDER FAMILY		
Cephalanthus occidentalis L. *	Buttonbush	20,17, 16,14, 13,12	
Mitchella repens L.	Partridge-berry	20,12	
Galium asprellum Michx.	Rough Bedstraw	13	
G. palustre L.	Marsh Bedstraw	16	
G. triflorum Michx.	Sweet-scented Bedstraw	20,12, 13	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Sambucus canadensis L.	Common Elder	20,13, 12,45	
Viburnum acerifolium L.	Maple-leaved Viburnum	45	
V. lentago L.	Nannyberry	20,17, 13,12, 45	45
V. rafinesquianum Schult.	Downy Arrow-wood	45	
Lonicera dioica L.	Glaucous Honeysuckle	20,12	
L. hirsuta Eat.	Hairy Honeysuckle	13	
Diervilla lonicera Mill.	Bush Honeysuckle	13	
DIPSACACEAE	TEASEL FAMILY		
Dipsacus fullonum L.	Teasel	20,13, 12	
CUCURBITACEAE	GOURD FAMILY		
Echinocystis lobata (Michx.) T. & G.	Wild Cucumber	20,13, 12	
ASTERACEAE	ASTER FAMILY		
Eupatorium maculatum L.	Spotted Joe-pye Weed	20,12	
E. perfoliatum L.	Boneset	20,10, 13,12	
Solidago altissima L.	Tall Goldenrod	45	45
S. caesia L.	Blue-stemmed Goldenrod	45	
S. canadensis L.	Canada Goldenrod	20,12, 45	45
S. *gigantea* Ait.	Late Goldenrod	45	
Aster lateriflorus (L.) Britt.	One-sided Aster	20,12, 45	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
A. macrophyllus L.	Large-leaved Aster	20,13, 12,45	
A. novae-angliae L.	New England Aster	31,20, 12,45	
A. puniceus L.	Red-stemmed Aster	45	45
A. simplex Willd.	Panicled Aster	45	45
Erigeron annuus (L.) Pers.	Annual Fleabane	12,13, 20	
E. philadelphicus L.	Philadelphia Fleabane	20,13, 12	
Antennaria neglecta Greene	Pussytoes	20,12	
Gnaphalium uliginosum L.	Low Cudweed	20	
Inula helenium L.	Elecampane	31,45	45
Polymnia canadensis L.	Small-flowered Leaf-cup		18
Ambrosia artemisiifolia L.	Common Ragweed	20,12	
Bidens cernua L.	Nodding Beggar-ticks	16,45	
B. frondosa L.	Beggar-ticks	45	
Anthemis cotula L.	Stinking Mayweed	20	
Leucanthemum vulgare Lam.	Ox-eye Daisy	13,45	45
Arctium minus (Hill.) Bernh.	Common Burdock	13,45	45
Cirsium vulgare (Savi.) Tenore	Bull Thistle	13,45	
Cichorium intybus L.	Chickory	31,20, 13,1	
Taraxacum officinale Weber	Dandelion	31,45	45
Prenanthes altissima L.	White Lettuce	12	
Hieracium auriantiacum L.	Orange Hawkweed	45	45
H. caespitosum Dumort.	Yellow Hawkweed	13,45	45
H. florentinum All.	King-devil	45	45
H. floribundum Wimm. & Grab.	Smoothish Hawkweed	12,13, 20	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
BRYOPHYTES			
SPHAGNACEAE			
Sphagnum palustre L.		16	
BRYACEAE			
Pohlia nutans Hedw. Lindb.		16	
RICCIACEAE			
Ricciocarpus natans (L.) Corda		45	

* Denotes the species is considered to be rare based upon recognized sources (See Section 4.4)

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE LF-4N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Great Blue Heron	*Ardea herodias*	1,13,22	36,5,40,8,34,38
Canada Goose	*Branta canadensis*	1,22	6,7,9,23,34,41
Wood Duck	*Aix sponsa*	22	9
Mallard	*Anas platyrhynchos*	22,46	6,9,25
Turkey Vulture	*Cathartes aura*	1,45	7,8,9,41
Bald Eagle	*Haliaeetus leucocephalus*		36
Northern Harrier	*Circus cyaneus*		4,9
Sharp-shinned Hawk	*Accipiter striatus*	31	
Red-shouldered Hawk	*Buteo lineatus* *		9
Red-tailed Hawk	*Buteo jamaicensis*	16,30,31,22	7,9,21
American Kestrel	*Falco sparverius*		9,36,46
Ring-necked Pheasant	*Phasianus colchicus*		7
Ruffed Grouse	*Bonasa umbellus*	16,22	28
Whooping Crane	*Grus americana*	1	
Killdeer	*Charadrius vociferus*	22	9
Spotted Sandpiper	*Actitis macularia*	22	9
Upland Sandpiper	*Bartramia longicauda*	22	4,9
Dunlin	*Calidris alpina*		40
American Woodcock	*Scolopax minor*	22	9
Rock Dove	*Columba livia*	22	9
Mourning Dove	*Zenaida macroura*	13,16,22,30,31	7,9,37,40
Yellow-billed Cuckoo	*Coccyzus americanus*	22	9
Great Horned Owl	*Bubo virginianus*		9
Common Nighthawk	*Chordeiles minor*	22	
Ruby-throated Hummingbird	*Archilochus colubris*		9
Belted Kingfisher	*Ceryle alcyon*		9
Red-headed Woodpecker	*Melanerpes erythrocephalus*	22	5,9
Downy Woodpecker	*Picoides pubescens*	16,22,31,45	9
Hairy Woodpecker	*Picoides villosus*	13,16,22,31	9
Northern Flicker	*Colaptes auratus*	22	9,40
Pileated Woodpecker	*Dryocopus pileatus*	16,22	5,9,21
Eastern Wood-Pewee	*Contopus virens*	13,22	9

TABLE 6 (cont'd)

COMMON NAME	LATIN NAME	OCCURRENCE AND SOURCES SITE	VICINITY
Willow Flycatcher	Empidonax traillii		9
Least Flycatcher	Empidonax minimus	22	
Eastern Phoebe	Sayornis phoebe		9
Great Crested Flycatcher	Myiarchus crinitus	22	9
Eastern Kingbird	Tyrannus tyrannus	13,22	9
Horned Lark	Eremophila alpestris	22	9
Tree Swallow	Tachycineta bicolor		9
Northern Rough-winged Swallow	Stelgidopteryx serripennis		9 9
Barn Swallow	Hirundo rustica	22	9
Blue Jay	Cyanocitta cristata	13,22, 31	9,27,33, 40
American Crow	Corvus brachyrhynchos	16,22	9
Black-capped Chickadee	Parus atricapillus	22,13, 16,31	9,21
White-breasted Nuthatch	Sitta carolinensis	16,31	9,21
House Wren	Troglodytes aedon	22	9
Eastern Bluebird	Sialia sialis *		6
Swainson's Thrush	Catharus ustulatus	22	
Wood Thrush	Hylocichla mustelina	13,22	9
American Robin	Turdus migratorius	13,22	6,9,37,40
Gray Catbird	Dumetella carolinensis	13,22	9
Brown Thrasher	Toxostoma rufum	13,22	9
Cedar Waxwing	Bombycilla cedrorum	22	9
European Starling	Sturnus vulgaris	16,22	9
Warbling Vireo	Vireo gilvus		9
Red-eyed Vireo	Vireo olivaceus	22	9
Golden-winged Warbler	Vermivora chrysoptera	22	
Tennessee Warbler	Vermivora peregrina	22	
Nashville Warbler	Vermivora ruficapilla	22	
Yellow Warbler	Dendroica petechia	22	9
Chestnut-sided Warbler	Dendroica pensylvanica	22	
Magnolia Warbler	Dendroica magnolia	22	9
Cape May Warbler	Dendroica tigrina	22	
Yellow-rumped Warbler	Dendroica coronata	22	
Black-throated Blue Warbler	Dendroica virens	22 22	
Bay-breasted Warbler	Dendroica castanea	22	
American Redstart	Setophaga ruticilla	22	

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Ovenbird	*Seiurus aurocapillus*	22	
Mourning Warbler	*Oporornis philadelphia*	22	9
Common Yellowthroat	*Geothlypis trichas*	13,22	9
Wilson's Warbler	*Wilsonia pusilla*	22	
Canada Warbler	*Wilsonia canadensis*	22	
Scarlet Tanager	*Piranga olivacea*	22	
Northern Cardinal	*Cardinalis cardinalis*	22	9
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	22	9
Indigo Bunting	*Passerina cyanea*	22	9
Chipping Sparrow	*Spizella passerina*		9
Clay-colored Sparrow	*Spizella pallida*		9
Field Sparrow	*Spizella pusilla*		9
American Tree Sparrow	*Spizella arborea*	16	
Vesper Sparrow	*Pooecetes gramineus*	22	9
Savannah Sparrow	*Passerculus sandwichensis*	22	9
Grasshopper Sparrow	*Ammodramus savannarum*	22	9
Song Sparrow	*Melospiza melodia*	13,30, 22	9
Swamp Sparrow	Melospiza georgiana		9
White-throated Sparrow	*Zonotrichia albicollis*	22	9
Dark-eyed Junco	*Junco hyemalis*		21
Bobolink	*Dolichonyx oryzivorus*	22	9
Red-winged Blackbird	*Agelaius phoeniceus*	13,19, 22	9,37
Eastern Meadowlark	Sturnella *magna*	22	9,40
Common Grackle	*Quiscalus quiscula*	13,22	9
Brown-headed Cowbird	*Molothrus ater*	22	9
Northern Oriole	*Icterus galbula*	22	6,9
American Goldfinch	*Carduelis tristis*	19,22	6,7,9
House Sparrow	*Passer domesticus*	30,31, 22	9

* Denotes that the species is considered to be rare based upon recognized literature sources (See Sections 4.4 and 5.5).

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE LF-4N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Masked Shrew	*Sorex cinereus*	22	
Eastern Cottontail	*Sylvilagus floridanus*	22,13,19,16,31	36,40,41
European Hare	*Lepus europaeus*	16	26,39
Woodchuck	*Marmota monax*	22,13,16	29,41
Grey Squirrel	*Sciurus carolinensis*	22,16,31	
Deer Mouse	*Peromyscus maniculatus*	16	
White-footed Mouse	*Peromyscus leucopus*	22	
Muskrat	*Ondatra zibethicus*	2,31,10	3,8,36,41
Meadow Vole	*Microtus pennsylvanicus*	22,16	
Coyote	*Canis latrans*	2	7,23,36,40
Wolf	*Canis lupus*	19	6,8,26,27
Red Fox	*Vulpes vulpes*	22,1,2,16	26,27,29,23
Raccoon	*Procyon lotor*	22,2,10,45	3,27,36,40,41
American Mink	*Mustela vison*		25,41
Striped Skunk	*Mephitis mephitis*	22	
White-tailed Deer	*Odocoileus virginianus*	22,1,19,45	5,7,8,26,27,28,29,23,35,36,40

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE LF-4N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Northern Spring Peeper	*Hyla c. crucifer*	22	
Gray Treefrog	*Hyla versicolor*	22,13	
Western Chorus Frog	*Pseudacris t. triseriata*	22	
Green Frog	*Rana clamitans*	22	
Northern Leopard Frog	*Rana pipiens*	22	
Common Snapping Turtle	*Chelydra s. serpentina*	10	33
Midland Painted Turtle	*Chrysemys picta marginata*	45	
Eastern Garter Snake	*Thamnophis s. sirtalis*	22,13	

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE LF-4N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Coho Salmon	*Oncorhynchus kisutch*		42,43
Chinook Salmon	*Oncorhynchus tshawytscha*		42,43
Rainbow Trout	*Salmo gairdneri*		44,43,42
Brown Trout	*Salmo trutta*		44
Brook Trout	*Salvelinus fontinalis*	16	16,44
Central Mudminnow	*Umbra limi*		32
Emerald Shiner	*Notropis atherinoides*		32
Common Shiner	*Notropis cornutus*	16	16
Blacknose Dace	*Rhinichthys atratulus*		16
Creek Chub	*Semotilus atromaculatus*	16	16,32
White Sucker	*Catostomus commersoni*	16	16,29,32
Northern Hog Sucker	*Hypentelium nigricans*	16	16
Rock Bass	*Ambloplites rupestris*		16
Pumpkinseed	*Lepomis gibbosus*		16
Smallmouth Bass	*Micropterus dolomieui*		16
Johnny Darter	*Etheostoma nigrum*		16

TABLE 10: CHECKLIST OF BUTTERFLY SPECIES RECORDED ON CANDIDATE SITE LF-4N IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
West Virginia White	Artogeia virginianus *		5

DATA SOURCES FOR TABLES 5-10

1. Anderson, 1984.
2. Mackie, 1984.
3. Corp, 1984.
4. Coulson, 1984.
5. Patrick, 1984.
6. Snow, 1984.
7. Bousfield, R., 1984.
8. Reid, 1984.
9. Ontario Breeding Bird Atlas, 1984.
10. Halton Region Conservation Authority, 1983.
11. Ontario Ministry of Natural Resources, 1979.
12. Crins _et al_., 1980.
13. Halton Region Conservation Authority, 1981.
14. Crins, 1984a.
15. Sutherland, 1984.
16. Regional Municipality of Halton, 1980a.
17. Regional Municipality of Halton, 1978b.
18. Regional Municipality of Halton, 1978a.
19. McLauchlan, 1984.
20. Crins, 1984.

DATA SOURCES FOR TABLES 5-10 (cont'd)

21. Gartner Lee Associates Limited, 1984c.
22. Regional Municipality of Halton, 1980b.
23. Johnston, 1984.
24. Attardo, 1984.
25. Leblanc, 1984.
26. Sherwood, 1984.
27. Love, 1984.
28. Vanzwol, 1984.
29. Hall, 1984.
30. Gartner Lee Associates Limited, 1984b.
31. Gartner Lee Associates Limited, 1984a.
32. Gaetan, 1984.
33. Marshall, 1984.
34. Da Silva, 1984.
35. Pompa, 1984.
36. Chaput, 1984.
37. Ford, 1984.
38. Ketelaars, 1984.
39. Marangoni, 1984.
40. Martin, 1984.

DATA SOURCES FOR TABLES 5-10 (cont'd)

41. Waid, 1984.
42. Ontario Ministry of Natural Resources, 1984a.
43. Ontario Ministry of Natural Resources, 1973.
44. Ontario Ministry of Natural Resources, 1983a.
45. Bird and Hale Limited, 1985.
46. Gartner Lee Associates Limited, 1984f.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site LF-4N from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 11. Interview numbers are related to identifications assigned by Ecologistics Limited during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview forms are contained in Table 12. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N.

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. Paul Patrick	306-025	LF-4N (SV)	47-1	- deer, herons, woodpeckers - unconfirmed West Virginia Butterflies - harvest wild raspberries
Ms. M.B. Kennedy	306-021	LF-4N (SV)	84-1a	- fishing - harvest strawberries and raspberries
Mr. Earl Snow	306-175 110-008 306-084 306-083 306-082 110-011	LF-4N (SV)	143-2	- bluebirds and other birds - deer, wolves - fuelwood - harvest mushrooms
Mr. H.C. Reid	306-011	LF-4N (SV)	519-2	- several bird species - deer, wolves - fuelwood and sawlogs - hunting

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Roy Bousfield	302-177 302-169 302-164 302-163	LF-4N (SV)	501-G	- deer, coyotes - several bird species - fuelwood from orchard
Mr. Bill Bousfield	60-032 60-031	LF-4N (S)	126-2	- fuelwood
Mr. & Mrs. M. Anderson	306-019	LF-4N (S)	5-2	- blue herons, possibly cranes - deer and waterfowl - deer, foxes and several bird species - harvest wild strawberries and chickory
Mr. J. Snyder	60-103	LF-4N (SV)	760	- none
Mr. John Micallef	306-085	LF-4N (S)	204	- none

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. John Reid	306-022 306-024 306-086	LF-4N (S)	516	- none
	306-023 302-052	LF-4N (SV)		
Ms. M.E. McLauchlan	306-017	LF-4N (S)	215-1	- several bird species - deer, wolves, rabbits - fishing in creek
Mr. Norm Mogil	306-086	LF-4N (S)	54-2	- none
Mr. Joe DeAngeles	306-085-10	LF-4N (S)	37-1a	- harvests from garden
Mr. & Mrs. Smith	306-022	LF-4N (S)	296	- none

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mrs. J. Peric	306-175	LF-4N (SV)	43-2	- none
Mr. Joseph and Norm Stutt	302-053 306-169-03 60-098 307-035 307-051 110-016 110-019 110-071 302-099 302-098 302-054 110-073 110-023 110-006	LF-4N (SV)	244-2	- fuelwood
Mr. Attardo	306-020	LF-4N (SV)	67-2	- rabbits and ducks
Mr. D. LeBlanc	306-170	LF-4N (SV)	49-2	- ducks around creek

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Donald Sherwood	306-023 306-007 306-006 306-009	LF-4N (SV)	55-2	- deer, fox, rabbits, wolves - fuelwood
Ms. Bertha Hall	306-174	LF-4N (SV)	78-2	- none
Mrs. G. Love	306-083	LF-4N (SV)	100-2	- wolves, fox, deer - fuelwood - harvest wild strawberries
Mr. & Mrs. A. Palermo	110-068	LF-4N (SV)	123-1	- harvest wild strawberries
Mr. & Mrs. H. Vanzwol	306-087	LF-4N (SV)	125-2	- deer. partridge
Mr. & Mrs. Hall	306-081	LF-4N (SV)	486-G	- deer - suckers in creek

TABLE 11. SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. James Johnson	306-026	LF-4N (SV)	31-1	- several birds, hawks, owls, cranes, geese - fox, deer, coyotes - harvests apples and strawberries
Messrs. J. & S. Scott	306-083	LF-4N (SV)	609	- none
Mr. Ken Wettlaufer	110-012 60-029	PI-1N* (SV) PI-1N (S)	293	- none
Mr. P. Szkilniak	110-009	PI-1N (SV)	35-2	- none
Mr. & Mrs. C. Ford	60-025	PI-1N (S)	22-1	- several common bird species
Ms. Beverley Ketelaars	60-023-10	PI-1N (S)	222-1	- blue herons

NOTE: This and the following interviews, described as PI-1N interview forms, cover properties which are also within the LF-4N study zone.

TABLE 11. SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Lloyd Moore	60-024	PI-1N (S)	781	- none
Mr. & Mrs. B. Pompa	60-027	PI-1N (S)	51-2	- deer - fuelwood
Mr. Walter Chlon	60-028	PI-1N (S)	238-2	- fuelwood
Mr. & Mrs. Kip Chaput	60-030	PI-1N (S)	15-2	- deer, raccoons - several bird species - great blue heron - harvests mushrooms and strawberries
Ms. Joanne Templeman	60-099	PI-1N (SV)	459-G	- fuelwood
Mr. & Mrs. M. Da Silva	60-100	PI-1N (SV)	467-G	- herons, ducks, geese
Mr. Van Wasseneer	60-101	PI-1N (S)	272	- none
	60-098	PI-1N (SV)		

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE LF-4N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. George Marshall	60-102	PI-1N (SV)	19-2	- birds, snapping turtle
Mr. & Mrs. Ian Waid	60-104-01	PI-1N (SV)	448-G	- several bird and mammal species - harvest raspberries
Mr. Salo	60-034	PI-1N (S)	37-2	- none

Interview Identification Number: ________

TABLE 12: BIOLOGY QUESTIONS LISTED ON WALK AND TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

9.0 BIOLOGY
SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale. Completed data forms and station location maps are in working files at GLAL.

Table 13 is an example of a completed field data form. It is for station 4 on Site LF-4N.

TABLE 13: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - LF-4N

FIELD INVESTIGATIONS

STATION 4 ROLL 2 PHOTO(S) 6

VEGETATION

VEGETATION ASSOCIATION Mx FRI DOMINANTS Ow5 Or2 Mh, Hi, Ar,

Strata	% Cover	Plot Size	Dominant Species - Sample Collected: (c)
Tree Species >6m	40	5	Pinus strobus Quercus alba Q. rubra
Tree Species <6m	10	5	Pinus strobus Ostrya virginiana
Shrub Species >1.5 m	10	5	Crataegus sp.
Shrub Species <1.5 m	1	5	Rubus allegheniensis
Graminoid/Herb Species	unknown	2	
Moss/Lichen Species	unknown	2	

Snags/Hectare absent

Average Canopy Height: FRI 21m, Field 20m Surface Wetness 0 Vegetation Mapping Change

Comments / Rare Or Uncommon Species:

WILDLIFE

Blue Jay - 3(c)
Black-capped Chickadee - 1(c)
White-breasted Nuthatch - 1(c)
Downy Woodpecker - 1(c)

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type Average Width Average Depth Permanence Turbidity

Approximate Area

Shoreline Conditions Bottom Conditions

Fish And Invertebrate Species Observed:

Submergent, Emergent Plant Species:

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

ridge between [illegible]

modified [illegible]

[illegible] Nov 20. 84

no [illegible]
[illegible]
Carex [illegible]
Betula papyrifera

Page 5 of 15

10.0 OWMC PHASE 4A - BIOLOGY FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2 SEPTEMBER, 1984

Gartner Lee Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ■ Markham, Ontario ■ L3P 3J9 ■ 416-477-8400
Telex-06-986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m^2. The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m^2 gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m^2. Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.0 APPENDICES

3.1 SITE ACCESS PERMISSION FORM

No.________

CANDIDATE SITE ________________________

PROPERTY ROLL NUMBER(S) ________________________

____

LANDOWNER:

NAME ________________________

ADDRESS ________________________

TELEPHONE NUMBER ________________________

LANDOWNER CONTACTED BY:

TELEPHONE __________ DATE OF CONTACT:

MAIL __________ ____________________

VISIT __________

PERMISSION TO ENTER PROPERTY:

GRANTED __________

NOT GRANTED __________ REASON ____________________

PERMISSION TO COLLECT PLANT SAMPLES:

GRANTED __________

NOT GRANTED __________ REASON ____________________

COMMENTS: ________________________

____

____

____

____

Gartner
Lee
Associates
Limited

3.2

FIELD OBSERVATION SHEET	BIOLOGICAL STATIONS :	**SITE**

Candidate Site: ____________ .   OWMC 84-S18.2   Gartner Lee Associates Limited

A) Background

Air Photos: ____________

Photographs Taken:

Roll: ______ **Photos:** ____________

Corresponding Maps:

____

____

Observer(s): ____________

Date Of Visit: ____________

Time & Duration ____________

Weather:

Present: ____________

Previous Day: ____________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ____________

____

____

Flora: ____________

____

____

Fauna: ____________

____

____

Comments: ____________

____

____

____

____

____

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

- Vegetation Association

Forest:	deciduous	D
	coniferous	C
	mixed	M
Thicket:	shrub	T
Field:	crop land	C
	recently abandoned	FR
	old	FO
	successional	FS
Others:	marsh	M
	industrial/residential/ manicured	R

Upland = u
Lowland = l

Descriptors:

flooded	(F)
cutover and/or recent secondary succession	(C)
post-fire succession	(P)
grazed	(G)
drained	(D)
plantation	(Pl)

- Surface Wetness

dry	0
moist	1
wet	2

Wildlife

- Observation Code

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

- Type

stream	s
pond	p
diffuse ponding and swales	dp

- Permanence

possibly permanent	p
probably intermittent	pi
intermittent	i

- Turbidity

clear	c
cloudy	cl
turbid	t

- Shoreline Conditions

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

- Bottom Conditions

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

Page ___ of ___

SITE

SITE ____

FIELD INVESTIGATIONS

STATION ____ ROLL ____ PHOTO(S) ____

VEGETATION

VEGETATION ASSOCIATION ____ FRI DOMINANTS ____

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species >6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species <1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ____

Average Canopy Height: FRI ____, Field ____ Surface Wetness ____ Vegetation Mapping Change ____

Comments / Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____

Approximate Area ____

Shoreline Conditions ____ Bottom Conditions ____

Fish And Invertebrate Species Observed : ____

Submergent, Emergent Plant Species : ____

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No. ______

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ______________________________

____

LANDOWNER:

NAME ______________________________

ADDRESS ______________________________

TELEPHONE NUMBER ______________________________

LANDOWNER CONTACTED BY:

TELEPHONE ________

MAIL ________

VISIT ________

DATE OF CONTACT:

____

ISSUE(S) TO DISCUSS:

____

____

____

____

____

____

____

REMARKS:

SKETCH MAP:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees.

CONIFEROUS: forest is composed of 80% or more coniferous trees.

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include Crataegus sp., Cornus racemosa and Spirea alba.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).

Others:

WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including *Typha angustifolia* and *Scirpus atrovirens*. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

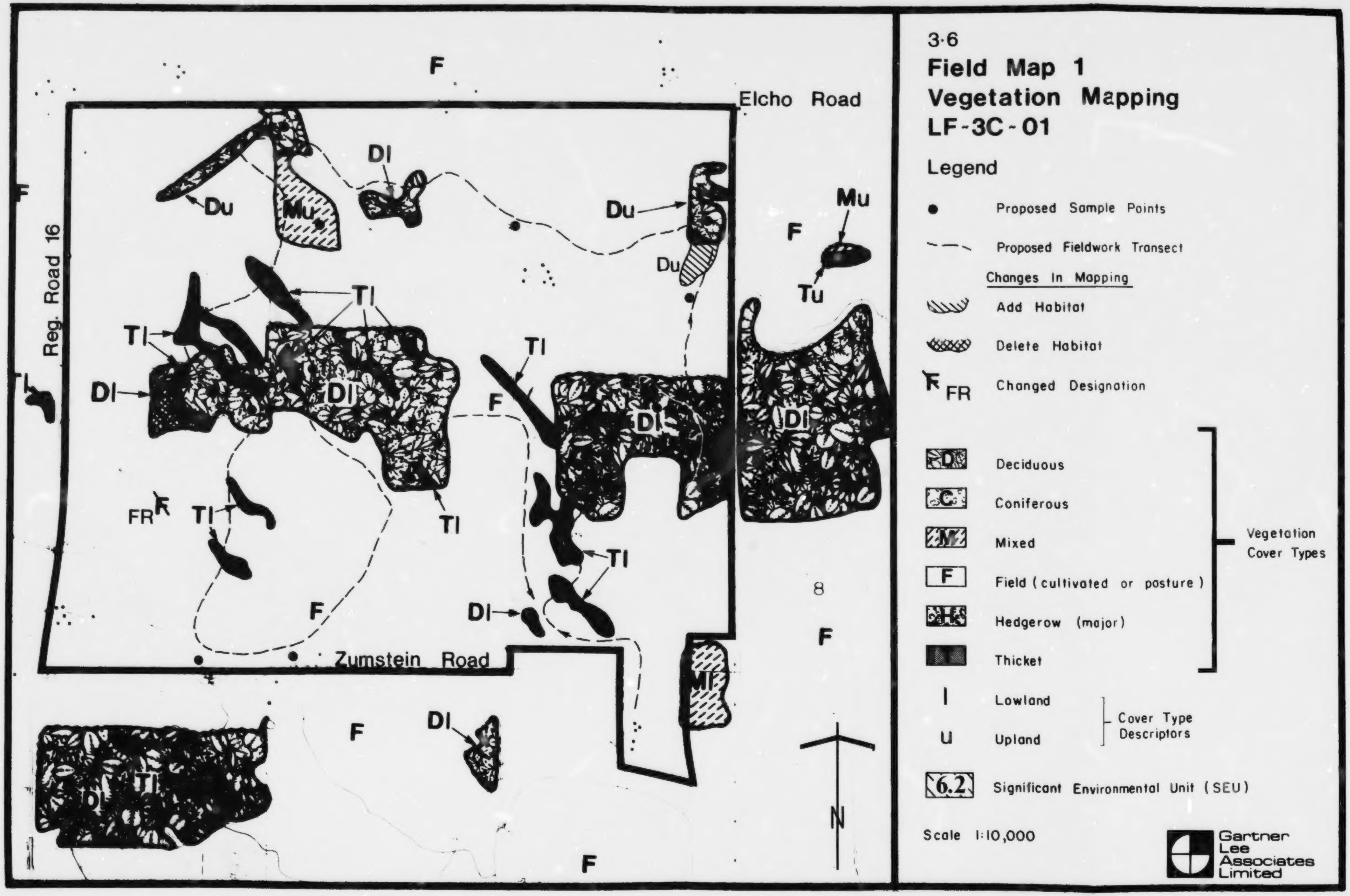
PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

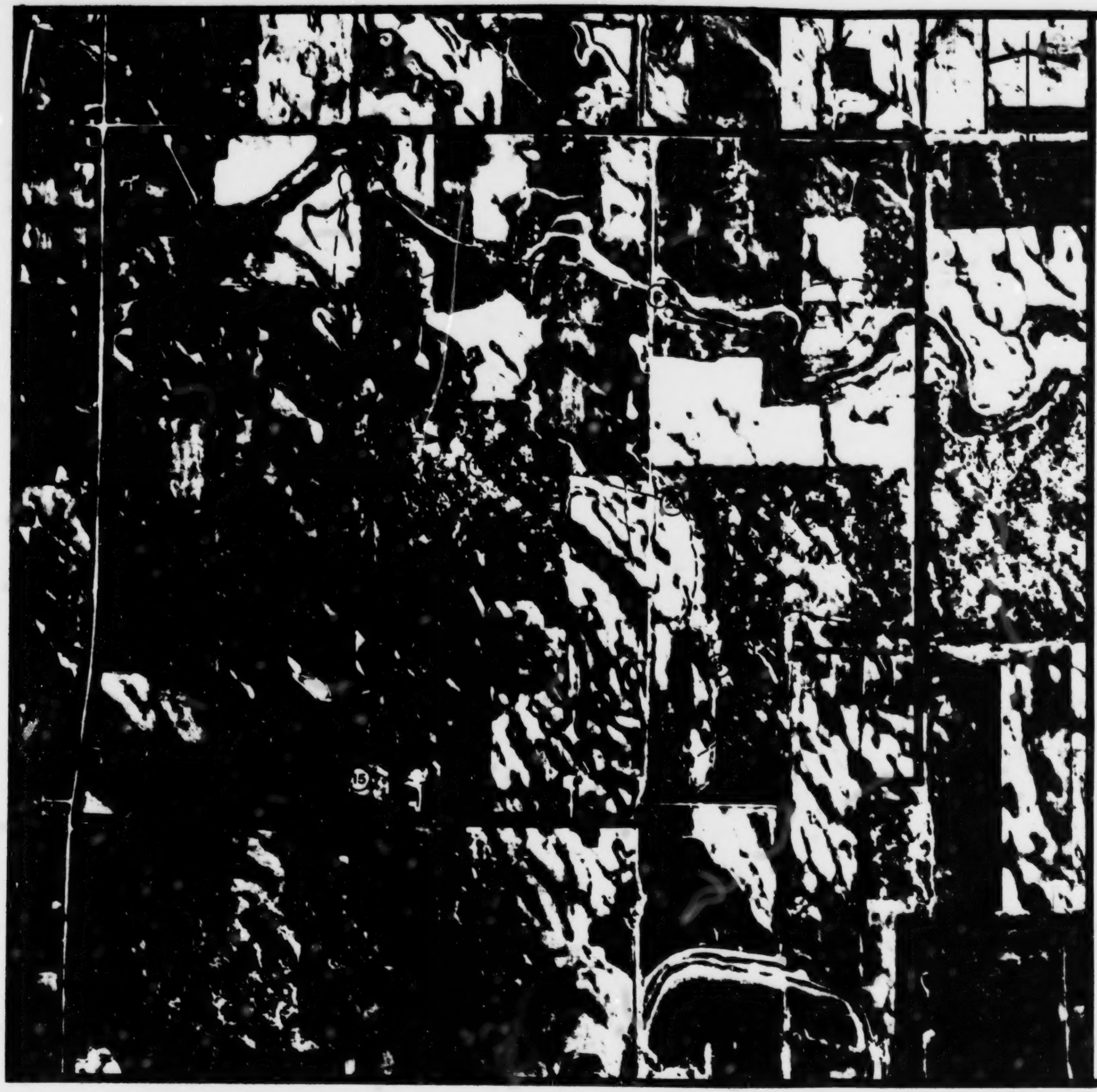
County	Township	Lot—Con.	Location	Date	Collector	No.	Habitat and Notes

Herbarium / Reseacher / Date


F
Elcho Road
Reg. Road 16
Zumstein Road
Du
Mu
Dl
Tl
Du
Du
Mu
Tu
F
Dl
Dl
Tl
Tl
Tl
Tl
Dl
FR
Tl
Tl
Dl
F
F
Ml
F
8
Dl
Tl
F
N
Legend
Proposed Sample Points
Proposed Fieldwork Transect
Changes In Mapping
Add Habitat
Delete Habitat
FR Changed Designation
D Deciduous
C Coniferous
M Mixed
F Field (cultivated or pasture)
H Hedgerow (major)
Thicket
Vegetation Cover Types
l Lowland
u Upland
Cover Type Descriptors
6.2 Significant Environmental Unit (SEU)
Scale 1:10,000
Gartner Lee Associates Limited

3·6

Field Map 1
Vegetation Mapping
LF-3C-01



3·7

Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥ Field Observation Station (example)

P6 → Photograph And Direction Taken

- - Transect Followed In Field

MAP NOTES

Scale 1:10,000

Gartner
Lee
Associates
Limited

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Number/
Numéro

6

SITE SELECTION PROCESS PHASE 4A:
TECHNICAL APPENDIX PI-27E -
EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee
Associates Limited

Gartner
Lee
Associates Limited

Consulting Engineering
Geologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ■ Markham, Ontario ■ L3P 3J9 ■ 416-477-8400
Telex-06-986278

September 10, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West,
11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix
PI-27E - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site PI-27E.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly
GARTNER LEE ASSOCIATES LIMITED

Grant Anderson

E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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BIOLOGICAL RESOURCES
STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr. - Associate and Senior Biologist of GLAL - Report Review

Kenneth Dance, M.Sc. - Associate and Senior Biologist of GLAL - Report Writing and Project Management

Thomas Hilditch, B.Sc.,Agr. - Biologist of GLAL - Data Collection

Donald Fraser, M.Sc. - Biologist of GLAL - Site Report Preparation

Wayne Weller, M.Sc. - Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site PI-27E and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Seven natural vegetation cover types occur on the site, including examples of both upland and lowland deciduous forest. No special vegetation associations or Significant Environmental Units are present.

A total of 100 plant species is known from Site PI-27E, of which five are considered rare. Wildlife related data indicate the presence of 22 bird species, six mammals, three reptiles and amphibians and one fish. One mammal species are considered rare.

Forestry related activities include minor fuelwood harvesting. No mammal trapping takes place and hunting is a very minor activity. Pike spearing occurs in Grassy Brook during the spring spawning runs.

Portions of seven Significant Environmental Units occur within the PI-27E site vicinity. Pike spawning occurs in Lyons Creek, Tea Creek, Grassy Brook and the Welland River. Wetlands associated with the margins of Lyons Creek serve as waterfowl production areas.

Four rare plant species, four rare birds and two rare mammals have been recorded in the site vicinity.

1.0 INTRODUCTION

1.1 BACKGROUND

The Ontario Waste Management Corporation (OWMC) is involved in a five-phase process for the selection of a siting option for facilities to treat liquid industrial and hazardous wastes. This process has incorporated input from a number of areas of expertise including agriculture, biology, hydrogeology, socioeconomics and transportation.

At the end of the third phase of the site selection process, eight candidate sites within the Golden Horseshoe region of southern Ontario were identified (OWMC 1984). Biological factors developed to fulfill OWMC's goal of minimizing environmental impact were among several factors used in selecting the eight candidate sites. Gartner Lee Associates Limited completed the technical input for biology as reported in "Site Selection Process, Phase 3B: Selection of Candidate Sites - Biology" (GLAL 1984f). In that report, Site PI-27E was thought to possess major biological constraints.

This report is a technical appendix to "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology" that documents and interprets field data and available biological information for Site PI-27E. It serves as a data base for comparing the eight candidate sites in the facility siting selection process.

1.2 SCOPE AND OBJECTIVES

As noted earlier, the previous Phase 3B evaluation of Site PI-27E was based primarily on existing data. For this Phase 4A assessment, the existing data base has been up-graded where possible and field work has been conducted on the site. The sampling and analytical elements of the program have been designed to meet study objectives and to provide an adequate basis for site comparisons.

Objectives of the Phase 4A biology study are:

- to describe existing biological conditions, on-site and in the site vicinity;
- to refine and confirm the Phase 3B data base through contact with pertinent agencies, experts and the public for both the site and site vicinity, and through field work on-site;
- to determine the level of constraint associated with biological resources;
- to assess the sensitivity and significance of biological resources; and
- to provide the Site Selection Team with biological assessments to use in refining site boundaries and in the siting option comparison.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The bulk of the existing biological information for Site PI-27E is summarized on two maps and in 11 tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

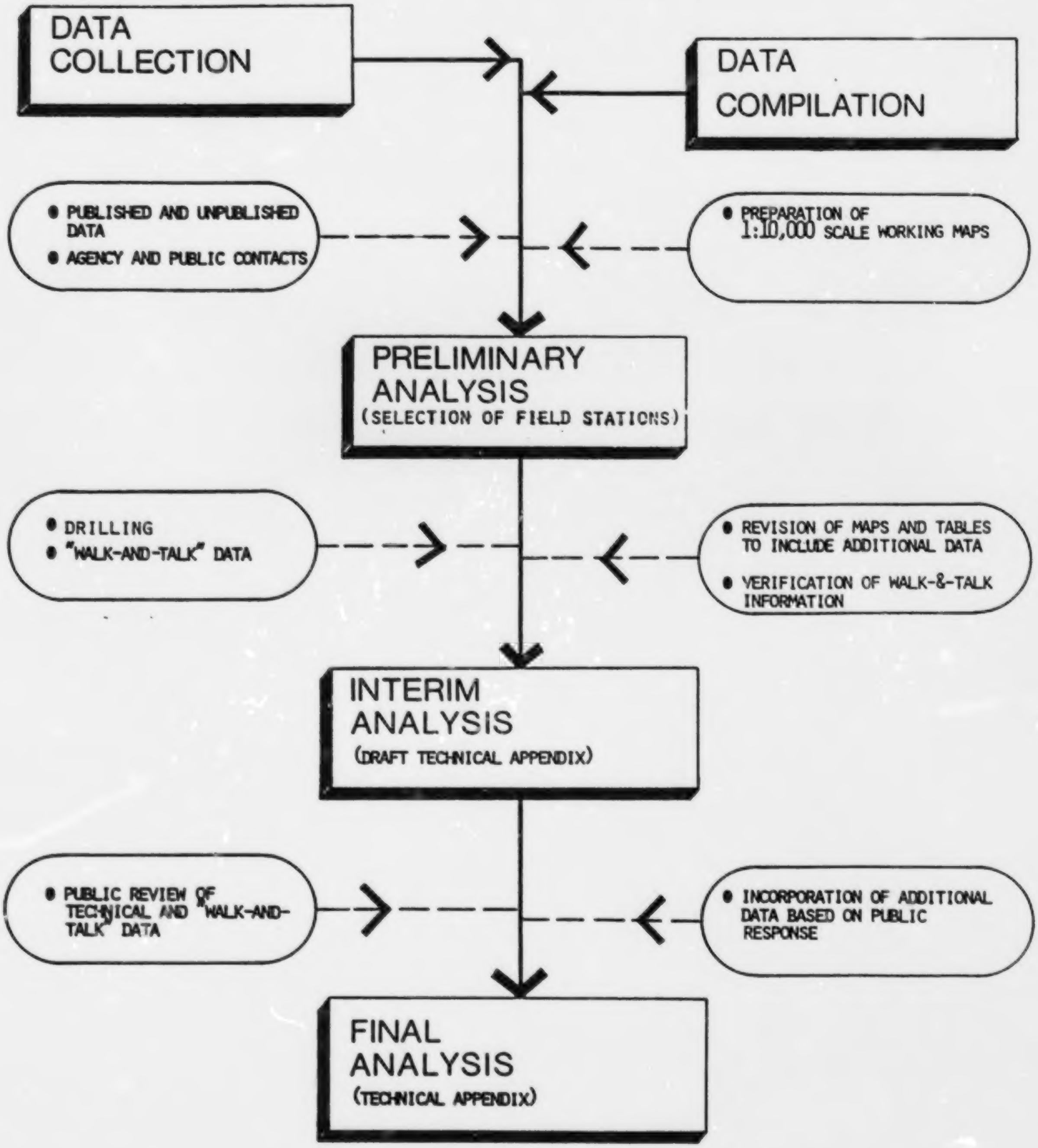
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
• PUBLISHED AND UNPUBLISHED DATA
• AGENCY AND PUBLIC CONTACTS
• PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS
(SELECTION OF FIELD STATIONS)
• DRILLING
• "WALK-AND-TALK" DATA
• REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
• VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS
(DRAFT TECHNICAL APPENDIX)
• PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
• INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS
(TECHNICAL APPENDIX)

Government reports on vegetation and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Niagara Peninsula Conservation Authority and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site PI-27E are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984e), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

An effort was made to verify important features identified prior to field work.

Field studies on Site PI-27E were conducted on September 21 and 24, 1984. Other visits to the site by GLAL biologists occurred on May 15, June 25, September 19, and November 5, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site PI-27E citizens group on August 1, 1984.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and "non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 9.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the PI-27E site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Niagara, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete evidence such as a photograph and/or specimen, and the

potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 9 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences discounted during the preliminary status assessment were not dealt with further. One of the most common reasons for exclusion was a change in status as a result of more recent information.

Swamp White Oak (Quercus bicolor) was originally designated as rare in Ontario and Canada by Argus and White (1977). A recent status review by Ball (pers. comm. 1984) has indicated that on the basis of its widespread distribution in southern Ontario, Swamp White Oak should no longer be accorded a rare status. This change will be reflected in a forthcoming publication of the Atlas of Rare Vascular Plants of Ontario Program.

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to species which utilize Site PI-27E and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

A further public meeting to review the preliminary biological information was held on 10 January, 1985. Additional data resulting from public responses were incorporated in the final report.

This technical appendix represents the interpretation of biological features and biological resource use at Site PI-27E to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A" Selection of a Preferred Site(s) - Biology".

3.0 SETTING

3.1 REGIONAL SETTING

Site PI-27E is situated in the eastern portion of the Niagara Peninsula. Its position relative to the other seven OWMC Candidate Sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within acquisition boundaries as portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It covers 188 ha and includes Parts of Lots 1, 2, 3, and 4, Broken Front Concession (Welland River), City of Niagara Falls, Regional Municipality of Niagara. It is bounded on the north by Grassy Brook Road, on the south by Biggar Road, on the east by Regional Road 98 (Montrose Road) and on the west by Crowland Avenue.

Site PI-27E is located within the corporate limits of the City of Niagara Falls (southwest corner) and is approximately 15 km southest of St. Catharines, 10 km northwest of Welland, and 4.5 km west of the Niagara River. The northwest corner of the site lies adjacent to the Welland River. The site is bisected by a hydro and railway corridor which crosses the site from southwest to northeast. Road access is gained via the Queen Elizabeth Way and west following regional roads.

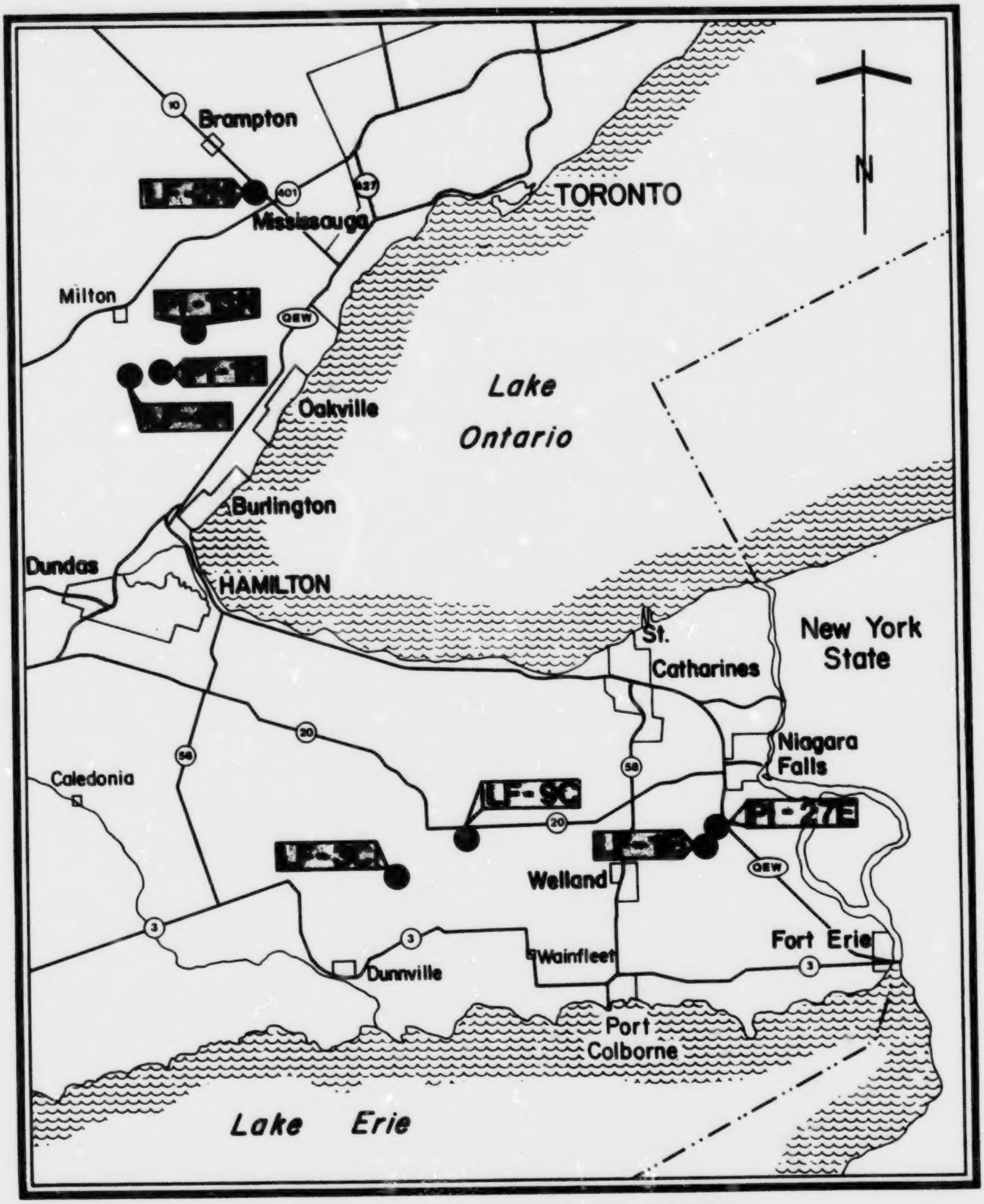

Brampton
10
401
427
TORONTO
Mississauga
N
Milton
QEW
Oakville
Lake Ontario
Burlington
Dundas
HAMILTON
St. Catharines
New York State
20
56
58
Niagara Falls
Caledonia
LF-9C
20
PI-27E
Welland
QEW
3
3
Wainfleet
Fort Erie
3
Dunnville
Port Colborne
Lake Erie

FIGURE 2 LOCATION OF CANDIDATE SITES

Miles 8 0 8 16
Kilometres 10 0 10 20

Site PI-27E is located on a portion of the Haldimand Clay Plain. The terrain is generally flat to gently rolling except where it is dissected by stream courses. These eroded valleys are relatively minor features of the landscape.

Elevations on site range from about 180 m along the southern boundary of the site to about 174 m in the northeast corner of the site adjacent to Grassy Brook. Site PI-27E drains to the Welland River.

4.0 EXISTING BIOLOGICAL RESOURCES - SITE

Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

4.1 OVERVIEW OF SITE BIOLOGY

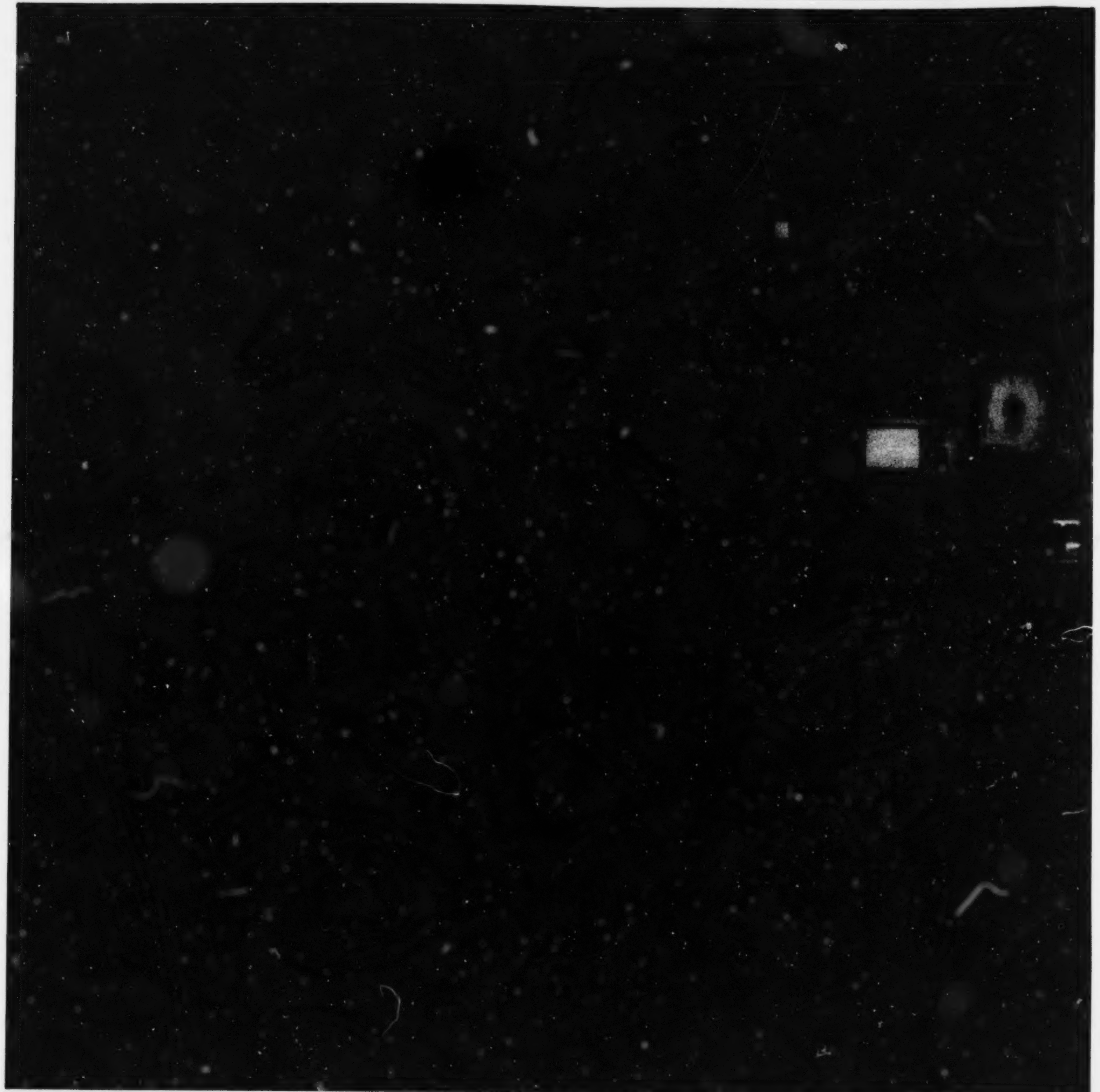
Four deciduous woodlots occur on the site (Figure 3) and collectively occupy approximately 10% of the site area. The dominant overstory species are noted in Section 4.2.2.

Areas of upland thicket, recently disturbed field, old field and marsh are also present. Approximately 60% of the site is currently in agricultural production.

Twenty-two bird species have been recorded within the acquisition area, 19 of which likely utilize the area for nesting purposes. Six species of mammals, three species of reptiles and amphibians and one fish have also been recorded from the site.

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated in Section 4.2.2.



Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS	PLANTS
Op Opossum	As Spray Aster
	Br Brookweed
	Oa Pin Oak
	M Swamp Rose Mallow
	Lf Many-fruited Ludwigia

▭ Forestry Potential

〰 Pike Spawning Areas

▬ Phase 3B Acquisition Boundary

Key Map: P1-27 East

Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
Grimsby
St Catharines
Brantford
Niagara Falls
Caledonia
Dunnville
Port Colborne
N

Scale Bar 500 0 500
250 0 250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 **Figure 3**

4.2.1 SPECIES LIST:

A total of 100 plant species has been recorded on Site PI-27E. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Seven natural vegetation associations are present on Site PI-27E. Cropland and unclassified land are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under four major cover type headings:

Forest

The two dominant forest cover types on the site are upland and lowland deciduous, both occupying approximately 14 hectares. Forest occurs primarily adjacent to the rail and hydro corridor separating the two site halves. While generally occurring in distinct blocks, there are some lowland slough pockets within upland forest.

The upland deciduous forest is dominated by White Oak (*Quercus alba*), Sugar Maple (*Acer saccharum*), White Ash (*Fraxinus americana*) and Shagbark Hickory (*Carya ovata*).

The lowland deciduous component is dominated by Red Maple (*Acer rubrum*), Red Ash (*Fraxinus pennsylvanica*), Pin Oak (*Quercus palustris*) and American Elm (*Ulmus americana*).

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE PI-27E

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Deciduous Forest	13
Lowland Deciduous Forest	14
Upland Shrub Thicket	<1
Lowland Shrub Thicket	9
Recently Disturbed Field	8
Old Field	12
Marsh	6
Other	
Cropland	116
Unclassified	9
TOTAL	188

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting all other cover type areas from the total site area.

Recent clearcuts have limited wooded areas to the north half of the site, with the exception of the southwest corner.

The wooded areas on-site are generally immature, dominated by pole-sized material. Small pockets of more mature hardwoods exist in the north-central portion of the site and isolated mature trees are located in bottomland areas along Grassy Brook. Within these pole stands, the sapling or regenerative layer is present in varying degrees. Generally, it composes a moderately dense understory.

Thicket

Lowland thicket, occupying approximately 9 hectares of the site, is concentrated in areas of recent disturbance. The largest thicket area occupies the site of an old clearcut forest south of the railway tracks. The dominant shrub species include Gray Dogwood (*Cornus racemosa*) and Hawthorn (*Crataegus pruinosa*). One small upland thicket patch less than one hectare in size occurs on the site.

Marsh

This vegetation association is linked with the two streams on the site. It is generally restricted to a narrow band of vegetation along the stream edges and occupies approximately 6 hectares.

The dominant narrow-leaved emergents include Sedge (*Carex lupulina*), Nut Grass (*Cyperus strigosus*), Reed Canary Grass (*Phalaris arundinacea*) and Rush (*Juncus nodosus*). Broad-leaved emergents include Arrowhead (*Sagittaria latifolia*) and rooted, floating plants include Japanese

Knotweed (Polygonum cuspidatum) and Water Smartweed (Polygonum punctatum).

Field

Both old and recently disturbed fields are present on the site.

Old field, occupying approximately 12 hectares, is located in the centre and northeast corner of the site. The central old field is a result of a clearcut which has occurred within the past decade. It is interspersed with pockets of marsh vegetation and is dominated by native herbaceous vegetation (e.g. Canada Goldenrod, Solidago canadensis). Both blocks of field have minor thicket components.

Recently disturbed field, occupying approximately 8 hectares of the site, is scattered throughout. Its dominants include Wild Carrot (Daucus carota), Teasel (Dipsacus fullonum) and Broad-leaved Plantain (Plantago major).

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS

Special associations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distribution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

No special vegetation associations or SEUs are found on Site PI-27E. However, it is important to note that the tentative identification of the southern drainage channel on-site as a Significant Environmental Unit (SEU) during Phase 3B (GLAL 1984f) has not been substantiated by Phase 4A biology research. The Ontario Ministry of Natural Resources (1983a) had identified the floodplain of Lyons Creek as being biologically significant in the Niagara District Land Use Guidelines. Pending further study, the floodplain of this drainage channel, identified by airphoto interpretation, was labelled as an SEU in the Phase 3B report (GLAL 1984f).

Both Gartner Lee Associates Limited field assessments and the wetland evaluation completed by OMNR in 1984 (OMNR 1984e) indicate that this site does not support extensive wetland or riparian forests and thus does not possess significant fish and wildlife habitat.

For the reasons noted above GLAL has concluded that the southern drainage channel does not possess the characteristics which justified the SEU status accorded to the mainstream Lyons Creek valley.

4.3 FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Twenty-two bird species, six mammal species, three reptile and amphibian species and one fish species have been recorded on Site PI-27E. Master species lists are presented in Tables 6 through 9.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

Approximately 6 ha of marsh are present in more than 20 small patches. Grassy Brook, a sluggish, warm stream, is the major water body on site. A drainage channel also exists in the southeast portion of the site, but it is intermittent.

Grassy Brook is the major habitat for aquatic species. This creek is known to contain Northern Pike, (Esox lucius), Common Snapping Turtles (Chelydra serpentina) and frogs.

4.3.3 EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Seven natural vegetation cover types occur on Site PI-27E. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site PI-27E cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

Over half of Site PI-27E (115 ha) is currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer (Odocoileus virginianus) and granivorous birds) as food sources but rarely support ground-nesting birds (e.g. Bobolink (Dolichonyx oryzivorus)) and small rodents (e.g. Meadow Vole (Microtus pennsylvanicus)). However, this vegetation cover type is most important as terrestrial wildlife habitat in later stages of plant succession. Old field habitat, while poorly represented on Site PI-27E (approximately 12 ha), is a potential breeding area for both ground and shrub-nesting birds such as Eastern Kingbird (Tyrannus tyrannus), Gray Catbird (Dumetella carolinensis), Yellow Warbler (Dendroica petechia), Song Sparrow (Melospiza melodia), and American Goldfinch (Carduelis tristis).

Mammals associated with this habitat type include Woodchuck (Marmota monax) and Eastern Cottontail (Sylvilagus floridanus).

Forests

The interface between field and forest habitats is occupied by "edge" species. Although narrow, the "edge" ecotone typically provides the greatest diversity of vegetation types and thus supports a correspondingly high number of wildlife species (Taylor and Taylor 1979).

The breeding bird community associated with "edge" species on Site PI-27E is likely an overlapping one, comprised of both field and forest dwellers. Woodlot margins are also favoured by deer.

The structure and diversity of the breeding bird community associated with the deciduous forest types on Site PI-27E is strongly influenced by the vertical complexity of the vegetation. These second-growth woodlots have attained an intermediate stage of succession and are characterized by stands of pole-sized trees with a moderately dense understory of saplings and shrubs.

The avian niches provided by second-growth woods are typically suited for occupation by insectivores and omnivores (Samson 1979). Most forage on the ground or at a low elevation. Canopy dwellers are probably absent from this immature forest type. Typical breeding birds which may be associated with the upland and lowland deciduous woods on Site PI-27E include Downy Woodpecker (Picoides pubescens), Northern Flicker (Colaptes auratus), American Crow (Corvus brachyrhynchos), Brown Thrasher (Toxostoma rufum), American Robin (Turdus migratorius), Ovenbird (Seiurus aurocapillus) and Yellow Warbler.

Thicket

Low lying wet thickets provide potential nesting habitat for Alder Flycatchers (Empidonax alnorum), Yellow Warblers, Common Yellowthroats (Geothlypis trichas) and Swamp Sparrows (Melospiza georgiana).

Marsh

The margins of Grassy Brook support scattered patches of marsh vegetation. These wet, grassy areas likely attract nesting Red-winged Blackbirds (Agelaius phoeniceus).

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds.

Pike runs have been reported in Grassy Brook to the east of the site by the Ontario Ministry of Natural Resources (1984c). This suggests that pike spawn both in Grassy Brook and the drainage channel passing through the southern half of the site. These pike spawning areas are of local significance, at best. OMNR (1984d) has indicated that pike spawning in Grassy Brook is not regionally significant.

4.4 RARE SPECIES

4.4.1 INTRODUCTION:

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation These are indicated in Tables 5 through 9 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed in Sections 2.2 and 7.1 of this technical appendix and in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

To make information presentation more logical, indicators of rare species are not used to divide the discussion. Rather, rare species discussions are organized by life form (animals and plants) and species. Each indicator is addressed within each species discussion.

The approximate locations of rare species occurring on the site are mapped in Figure 3 at an original scale of 1:5,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species where, for example, several individuals are found in close proximity to one another. Information concerning actual numbers of individuals of rare species and their on-site distribution is presented later in this chapter and in Table 2.

However, it should be emphasized that existing rare species data are based on preliminary investigations. Further on-site field work could result in an increase in both the numbers and individuals of rare species.

4.4.2 RARE ANIMAL SPECIES:

One mammal species which has been reported from Site PI-27E, the Opossum (Didelphis virginiana), is considered to be rare in Ontario (van Zyll de Jong 1983). The approximate location of this sighting is noted in Figure 3.

Opossum

The present distribution of this species in southern Ontario is confined to the north shore of Lake Erie, the Niagara Peninsula and the Thousand Island region (van Zyll de Jong 1983). Of sporadic occurrence, Opossums appear to have invaded Ontario from Michigan and New York (Peterson and Downing 1956). They are almost exclusively restricted to the Deciduous Forest Region (Rowe 1972), where they are generally able to withstand moderate winter conditions.

There is one recent report of an Opossum on Site PI-27E (McGrath, pers. comm. 1984). Although rare throughout much of southern Ontario, at present this marsupial appears to be locally uncommon in Niagara R.M. The regional status of the Opossum may change however, as populations tend to undergo rapid fluctuations in response to changing climatic conditions (Hamilton 1958).

4.4.3 RARE PLANT SPECIES:

Three of the five rare species recorded on Site PI-27E are considered to be rare in Ontario and Canada according to Argus and White (1977). These are Pin Oak, Swamp Rose Mallow (*Hibiscus palustris*), and Many-fruited Ludwigia (*Ludwigia polycarpa*). The remaining two, Brookweed (*Samolus floribundus*) and Spray Aster (*Aster pilosus*), are considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

Relative population sizes and distribution patterns of rare plant species on Site PI-27E were determined from field observations conducted by Gartner Lee Associates Limited (GLAL) and an additional source (Meyers 1984). Numbers of individuals were noted within field study plots. These totals were supplemented by observations made between sampling stations. Known localities of rare plants are plotted on Figure 3.

Pin Oak

Fifty specimens were encountered during GLAL field work at four sampling stations. Its distribution appears widespread on the site, associated with the lowland deciduous woods. This appears especially true with the sloughs encountered in woods north of the railroad tracks near the centre of the site (Figure 3). These slough areas exhibit both a dense Pin Oak canopy and a vigorous regenerative layer.

The provincial and national status of Pin Oak is currently under review by the Rare Vascular Plant Atlas of Ontario Program in Ottawa but is not expected to change (Ball, pers. comm. 1984). It is not considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

Swamp Rose Mallow

This species was not observed during GLAL fieldwork. It was reported from the area of Grassy Brook in the northeast corner of the site (Meyers 1984).

The species is considered rare in Ontario and Canada (Argus and White 1977) and is confined to the southern deciduous forest in Ontario (Soper 1962).

Many-fruited Ludwigia

Several individuals were observed along the banks of Grassy Brook in the northeast corner of the site, close to the location noted for Swamp Rose Mallow.

The species is considered to be rare in Ontario and Canada (Argus and White 1977).

Brookweed

A patch of this species was observed in the shallow water of Grassy Brook in the northeast corner of the site. Its location is very close to the Many-fruited Ludwigia and the reported Swamp Rose Mallow.

The species is considered rare in the Niagara Frontier Region (Zander and Pierce 1979).

Spray Aster

A number of specimens were recorded at one station, in the southeast corner of the site. The field sampled exhibited recent signs of disturbance associated with an abandoned building.

The species is considered rare in the Niagara Frontier Region (Zander and Pierce 1979). The aster was recently delisted from the Atlas of Rare Vascular Plants in Ontario and included with a more common variety of taxonomic reasons (Argus and Keddy, undated; Semple, *pers. comm.* 1984).

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered are: forestry, trapping, hunting and fishing. Resource use has been identified as a biological factor, the rationale for which is provided in "Site Selectin Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.5.1 FORESTRY:

Forestry potential (Figure 3) refers to wooded areas which could be commercially logged for sawlogs, veneer logs and fuelwood.

On-site assessments of forestry potential were made by GLAL on the basis of the following criteria: size of woodlot, species composition, age and size of trees, accessibility and aspect. Deciduous upland forests generally have a greater potential from deciduous lowland forests, although both cover types are considered.

Additional information pertaining to the forestry potential of Site PI-27E was provided by the Ontario Ministry of Natural Resources (OMNR) and questionnaire results.

Half of the woods on the site is upland deciduous, dominated by valuable hardwood species such as Sugar Maple and White Oak. The other half is lowland deciduous forest dominated by less valuable species such as Red Maple and Red Ash.

The bulk of the forest on-site is composed of pole-sized material, with pockets of more mature hardwoods in the north-central portion of the site and scattered larger specimens in the bottomlands along Grassy Brook.

Excluding the small pockets of more mature trees, the current forestry value is restricted to fuelwood thinning in upland areas. The lowland woods are generally composed of more defective trees presenting more difficult management challenges (OMNR 1978).

Potential sawlogs and veneer logs exist in small numbers. Some potential also exists for maple syrup production in the forested upland areas of the site.

Cutting fuelwood for personal consumption (Warner, C., pers. comm. 1984) appears to be the only forestry activity on Site PI-27E. No evidence of recent cutting or timber cruising was observed during GLAL visits to the site.

Within a regional context, forestry is not a significant resource use on Site PI-27E. Past forestry activities have contributed to a greater diversity of natural vegetation types (old field, thicket) which has resulted in a greater diversity of terrestrial wildlife.

4.5.2 TRAPPING:

Site PI-27E lies within the trapping area worked by one licensed trapper (OMNR 1984a).

In 1983-84 this individual harvested 125 Muskrats (*Ondatra zibethicus*) and several Raccoons (*Procyon lotor*) from the area (Stewart, *pers. comm.* 1984). Trapping activity was confined to Thompson's Creek and areas along the Welland River; no animals were captured on the site itself.

4.5.3 HUNTING:

Site PI-27E is described as a "good general deer hunting area" (OMNR 1984a). However, this sentiment is not corroborated by landowner questionnaire results. None of those interviewed indicated that they hunt on their properties.

Hunting is not a significant biological resource use on this site.

4.5.4 FISHING:

Fishing pressure on Site PI-27E is described as being "low to nil" (OMNR 1984c). Although Northern Pike are known to spawn near the mouth of Grassy Brook, upstream regions of this creek are subject to an intermittent flow of water.

"Possible" pike spawning may occur upstream on the portion of Grassy Brook which lies within Site PI-27E (OMNR 1984c). Although spear fishing of pike has been observed in Grassy Brook (Gerryts, pers. comm. 1984), the exact location is unknown.

4.6 SUMMARY-SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to present the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 2 Summary Site Biological Resources PI-27E

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURSE USE			
No. OF RARE SPP	No. OF INDIVIDUALS	DISTRIBUTION	SPECIES LIST	AQUATIC HABITAT	TERR.WILDL. HABITAT	SPECIAL HABITATS	SPECIES LIST	AREA NAT. VEGETATION	NO. OF COVER TYPES	SPECIAL ASSOC./SEU	FORESTRY	TRAPPING	HUNTING	FISHING
● Opossum	1 reported	north-central portion of site	●22 bird species ●6 mammal species ●3 reptile and amphibian species ●1 fish species	●Grassy Brook ● unnamed drainage channel, southern part of site	●7 natural vegetation cover types ●less than 30ha of forest ●some thicket, marsh and old field habitat ●habitat for forest edge, wetland and field communities	●possible pike spawning in Grassy Brook and unnamed drainage channel, not significant	● ~100 plant species	●Upland Deciduous Forest 13ha ●Lowland Deciduous Forest 14ha ●Upland Shrub Thicket <1ha ●Lowland Shrub Thicket 9ha ●Recently Disturbed Field 8ha ●Old field 12ha ●Marsh 6ha	●7 natural vegetation cover types see list to left	● None	● minor fuelwood harvest ● some woodlots clear cut during past decade	● no trapping on site ● one licensed trapper in the area, according to MNR	●very minor activity	●"low to nil" fishing activity in Grassy Brook
● Pin Oak	50 found	lowland deciduous woods												
● Swamp Rose Mallow	reported	northeast corner of site												
● Many-fruited Ludwigia	one station found	banks of Grassy Brook, NE corner of site												
● Spray Aster	one station found	southeast corner of site												
● Brook-weed	one patch found	in Grassy Brook, NE corner of site												

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

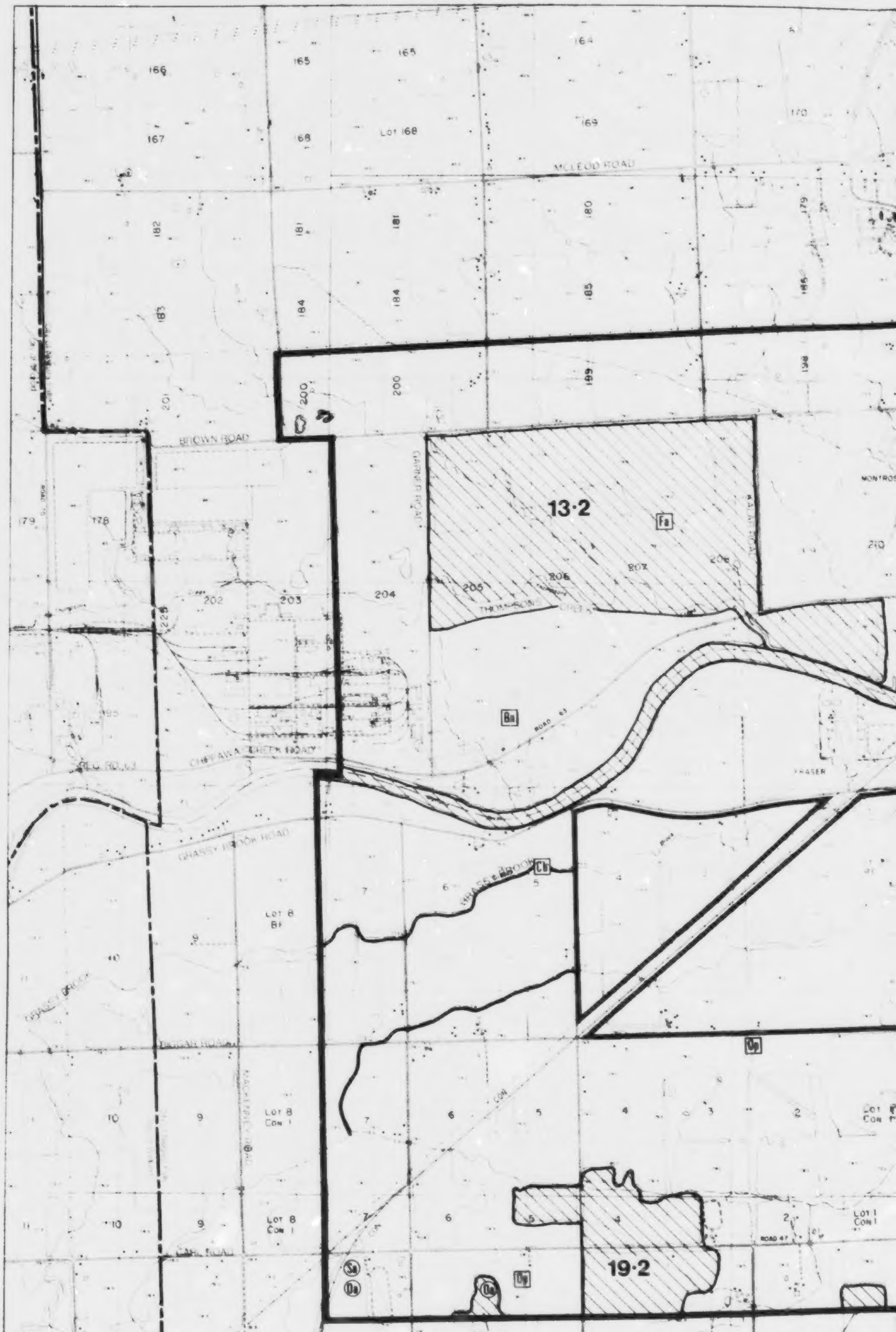
5.1 INTRODUCTION

Site vicinity is defined as the area which lies outside Site PI-27E within approximately a 2.0 km radius of the acquisition boundary. The PI-27E site vicinity boundary is delineated in Figure 4 and referred to as "Site Vicinity Study Area Boundary".

A total of 142 plant species has been recorded in the site vicinity (Table 5). Eighty-two of the 111 bird species known from the site vicinity are permanent or summer residents which possibly breed in the area (Ontario Breeding Bird Atlas 1984; Table 6). An additional 22 species of mammals, three species of amphibians and reptiles and 24 species of fish are known to occur in the site vicinity (Tables 7 through 9 respectively).

In general, the pattern of vegetation cover types found throughout the site vicinity is similar to that which exists on the site itself.

Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations, and rare species.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19·2
19.2
19.3
MCLEOD ROAD
BROWN ROAD
CHIPPAWA CREEK ROAD
GRASSY BROOK ROAD
GRASSY BROOK
SODOM ROAD
CARL ROAD
BIGGAR ROAD
MORRIS ROAD
CROWLAND AVENUE
MISENER ROAD
YOUNG ROAD
MONTROSE
FRASER
REG. RD. 63
ROAD 63
ROAD 47
Lot 168
Lot 8 BF
Lot 8 Con 1
Lot 8 Con 2
Lot 1 Con 1
Lot 8
Fa
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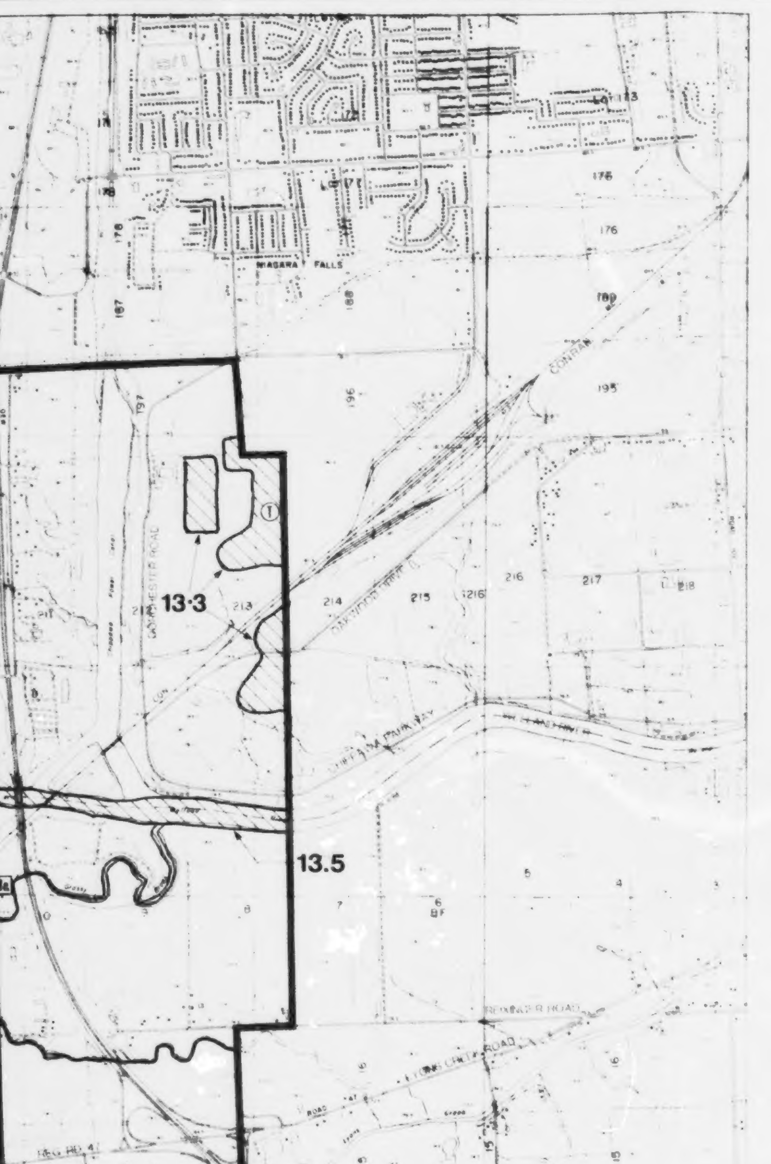

NIAGARA FALLS
CONRAIL
13·3
13.5
13·6
13·8
OAKWOOD DRIVE
LYONS CREEK ROAD
REG. RD. 47
MONTROSE ROAD
LYONS CREEK
REG. RD. 98
①
Fg

Contour Interval in Metres

1:10 000 base mapping produced by Surveys and Mapping Branch, Ministry of Natural Resources between 1978 and 1984

OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS
- Op Opossum
- Be Eastern Bluebird
- Bn Northern Bobwhite
- Fa Acadian Flycatcher
- Cb Yellow-breasted Chat
- Fg Grey Fox

PLANTS
- Qa Pin Oak
- Sa Southern Arrow-wood
- T Tupelo

Significant Environmental Units

▨ ESAs, ANSIs and AIBRs

13·3 Unit number
Candidate area number

Significant Fish and Wildlife Features

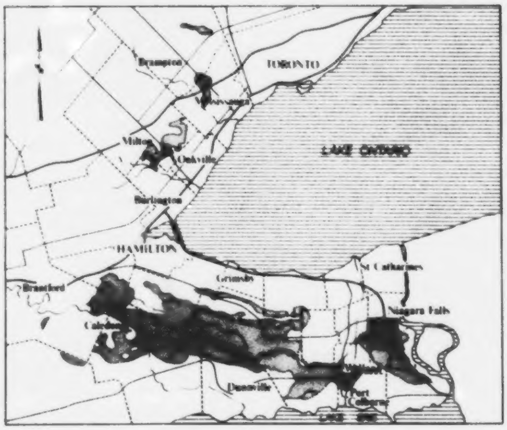
〰 Pike Spawning Areas

☐ Important Waterfowl Production Areas

— Phase 3B Acquisition Boundary
— Site Vicinity Study Area Boundary

Key Map: **PI-27 East**

Part of Lots 1, 2, 3, and 4; Broken Front Concession Welland River; City of Niagara Falls; formerly in the Township of Crowland


Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
St Catharines
Grimsby
Brantford
Caledonia
Niagara Falls
Dunnville
Port Colborne
LAKE ERIE

1000 feet 0 1000
500 metres 0 500

EXISTING BIOLOGICAL CONDITIONS,
PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

September 1985 **FIGURE 4**

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definitions of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The entire area of one SEU and portions of six others occur within the PI-27E site vicinity (Figure 4). Areas of the four natural vegetation cover types represented in SEUs are noted in Table 3.

Cyanamid Corners (SEU 13-2), located north of the Welland River, is a 60 ha area which contains a mature maple-beech-oak forest and Thompson's Creek. This SEU occupies much of the northwest corner of the PI-27E site vicinity and is 500 m due north of the site at its closest point. Cyanamid Corners has been designated as an ESA by Brady _et_ _al_. (1980a) on the basis of the following: the area serves as a water recharge area, contains an abundance of wildlife, supports rare species, and exhibits a range of successional stages.

Three portions of the Ramsey Road Woodlot (SEU 13-3) fall within the northeast corner of the PI-27E site vicinity. The nearest portion is situated 1.25 km from the northeast corner of the site. This 180 ha area consists of a mix of deciduous woodland, successional fields and swamp. Due to the presence of several rare tree species, the Ramsey Road Woodlot has been designated as an ESA by Brady _et_ _al_. (1980a).

TABLE 3. AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, PI-27E.

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
SEU	
Deciduous Forest	143
Thicket	46
Wetland	7
Successional Field	11
Other	
Deciduous Forest	191
Mixed Forest	8
Coniferous Forest	11
Thicket	45
Wetland	41
Successional Field	69
TOTAL	572

* Areas are approximate and are rounded to whole numbers.

The entire length of the Welland River (SEU 13-5) has been identified as an ESA by the Regional Municipality of Niagara (1981). However, in its Policy Plan the boundaries of this SEU have not been precisely defined nor have its biological amenities been documented in detail. The Welland River flows through the centre of the site vicinity and lies directly adjacent to the northwest corner of site PI-27E. This watercourse supports populations of sport and coarse fish and OMNR (1984b) indicates that pike spawning is known to occur along that portion of the river which lies within the site vicinity. Numbers of pike spawning at specific locations are not known.

Lyons Creek (SEU 13-6) has been identified as an ESA by the Regional Municipality of Niagara (1981) and is an Area of Important Biological Resources (OMNR 1983a). It flows through the southeast corner of the site vicinity and, at its closest point, is situated 750 m from the site itself. This wetland complex is considered to be of "local significance" as a waterfowl production and staging area (OMNR 1984e), provides breeding or feeding habitat for an unspecified "provincially significant animal species" (OMNR 1984e), and is a spring spawning area for Northern Pike (OMNR 1984d).

Pike spawning in Lyons Creek is "relatively important" in the District context (OMNR 1984d). This watercourse has been described as having the highest pike production in the entire Niagara River watershed (OMNR 1984d).

Black-crowned Night-Herons (Nycticorax nycticorax) reportedly nested near Lyons Creek "within the past five years" (OMNR 1984e). Apparently this heronry is no longer active. No mention is made of the size or specific location of this heronry. However it is highly unlikely that it occurred in the small portion of Lyons Creek which occupies the site vicinity.

A small section of the Willoughby Marsh (SEU 13-8) occupies the extreme southeast corner of the PI-27E site vicinity, approximately 2.0 km from the site itself at its closest point. This large (592 ha) marsh is linked by small parcels of deciduous woodland and successional fields.

The Willoughby Marsh satisfies five of the ESA criteria established by Brady et al. (1980a): it is a distinctive landform (wetland) of limited representation in the Region, acts as a water storage and recharge area, is an example of a remnant wetland habitat, supports rare species, and provides an extensive amount of wildlife habitat.

The Horse Track Woodlot (SEU 19-2) is situated approximately 600 m due south of Site PI-27E. The overstory stratum of this 115 ha woodlot is dominated by a maple-beech-oak association. On the basis of having fulfilled one ESA criterion, the presence of rare species, this area has been designated as an ESA (Brady et al. 1980a).

The northern end of the Young Woodlot (SEU 19-3) extends into the south central portion of the site vicinity to within 1.25 km of the site itself. This 64 ha area is characterized by disturbed, second growth woodland. The Young Woodlot contains several rare plant species and as such, has been accorded ESA status (Brady et al. 1980a).

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

Fish Spawning Areas

As noted in Section 4.5.4, Northern Pike spawn from the mouth of Grassy Brook upstream to the site. Although fisheries population statistics for this watercourse are unavailable, pike spawning is "not significant" in a District context (OMNR 1984a).

The unnamed stream which drains the southern half of the site and passes through the site vicinity is thought to support a pike spawning run. Pike spawning has also been reported for Tea Creek (OMNR 1984b).

Fish spawning areas associated with SEUs are discussed in Section 5.2.

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within that portion of the site vicinity which is not designated as SEU. Six natural vegetation associations are represented. The approximate area of each vegetation association is indicated in Table 3. In general, the site vicinity vegetation is of similar structure and composition to that studied on Site PI-27E.

Forest

A mix of deciduous, coniferous and mixed forest is present in the site vicinity. The deciduous woods represent the largest component of natural vegetation, covering approximately 191 hectares.

The woods are fragmented and widely scattered blocks, varying in size from less than one hectare to about 15 hectares in size.

Small coniferous plantations and pockets of mixed woods (generally overgrown coniferous plantings) occur in the northeast and southeast corners of the vicinity.

Thicket

Large thicket areas occur north of the Welland River in the vicinity. Other smaller pockets occur scattered throughout the vicinity to a total area of 45 hectares.

Wetland

Wetlands in the site vicinity total approximately 41 hectares. The largest block of wetland is associated with industrial settling ponds (Cyanamid) in the northwest corner. Smaller wetland pockets are located within thicket areas north of the Welland River.

Successional Field

Blocks of successional field totalling 69 hectares are concentrated in the northeast corner of the site vicinity.

Since no field work was conducted in the site vicinity, the significance of site vicinity natural vegetation units as wildlife habitat can only be speculated upon. Most of the woodlots found in the site vicinity are substantially larger in area than those found on the site itself and may harbour a greater diversity of wildlife. Although highly fragmented, the forested areas in the southern portion of the site vicinity may collectively function as a travel corridor for wildlife, linking larger wooded tracts.

5.5 RARE SPECIES

Where known, the approximate locations of rare species occurring in the site vicinity are mapped in Figure 4 at an original scale of 1:10,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species, where, for example, several individuals are found in close proximity to one another. For information concerning actual numbers of individuals of rare species and their on-site distribution, the reader is referred to the accompanying text of Section 5.5.

5.5.1 RARE ANIMAL SPECIES:

Four rare birds and two rare mammals have been recorded in the site vicinity.

Northern Bobwhite (Colinus virginianus)
All native Bobwhite are believed to have been extirpated in Niagara R.M. and present sightings involve introduced birds (Beardslee and Mitchell 1965). Sheppard (1970) mentions the existence of several coveys in Willoughby Township near Chippawa, circa 1950. Two hundred and fifty birds were released in what was formerly referred to as Lincoln County in 1961 (Dorst 1961). Knapton (*pers. comm.* 1984) encountered a singing male Northern Bobwhite several hundred metres northwest of Site PI-27E in the summer of 1984 (Figure 4).

This species appears to be a rare and local breeder in the Regional Municipality of Niagara. Because of its widespread decline in southern Ontario during this century the Northern Bobwhite is considered provincially rare by Eagles and McCauley (1982).

Acadian Flycatcher (Empidonax virescens)
In the summer of 1984, a singing male Acadian Flycatcher was recorded in Cyanamid Woods, less than 2 kilometres due north of Site PI-27E (Knapton and Foley 1984; Knapton, *pers. comm.* 1984; Figure 4).

The only published account of an Acadian Flycatcher nest in Niagara R.M., at Point Abino in 1956, is cited in Beardslee and Mitchell (1965). The species is considered "irregular" and "rare" by both Beardslee and Mitchell (1965) and Sheppard (1970). It was formerly thought to be more common in large unbroken tracts of deciduous woodland.

The Acadian Flycatcher is a rare and local breeder in Niagara R.M. This species reaches the northern limit of its breeding distribution in southern Ontario and has been assigned the status of a provincially rare breeding bird species by Eagles and McCauley (1982).

Eastern Bluebird (*Sialia sialis*)

Bluebirds have been reported from a property which abuts the northeast corner of Site PI-27E (Sider, *pers. comm.* 1984; Figure 4). However, this observation may involve migrant individuals, as evidence of breeding is presently lacking.

Throughout much of its range, the Eastern Bluebird has experienced a pronounced population decline in recent years (Tate and Tate 1982). The species was recently added to the list of rare Canadian taxa by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Muir 1984).

Sheppard (1970) describes the bluebird as "formerly a reasonably common summer resident" which is now "quite a rarity" in localities where it was once prevalent. This trend is corroborated by preliminary (1981-1983) results of the Ontario Breeding Bird Atlas Project. As of 1983, no breeding evidence for the Eastern Bluebird was recorded in any of the 10 km square units containing or adjacent to Site PI-27E (Ontario Breeding Bird Atlas 1984).

Yellow-breasted Chat (*Icteria virens*)

In the summer of 1984, Knapton (*pers. comm.* 1984) recorded a singing male less than 100 m west of Site PI-27E (Figure 4).

This individual was encountered twice in the same location, ten days apart. This apparent territoriality is suggestive of "probable" breeding (Eagles and Cadman 1981).

A southern warbler of "rare occurrence" in Niagara (Beardslee and Mitchell 1965), the Yellow-breasted Chat nested near St. Catharines in 1962 (Sheppard 1970).

The Yellow-breasted Chat is a rare breeding species in the Regional Municipality of Niagara. It is also considered provincially rare by Eagles and McCauley (1982).

Opossum

Opossums have been reported from three locations within the site vicinity (Pietrangelo, Ms. D., *pers. comm.* 1984; Hamilton, *pers. comm.* 1984; Warner, A., *pers. comm.* 1984; Figure 4). For the provincial and regional status of this species the reader is referred to Section 4.4.2 of this technical appendix. One of the Opossum locations occurs in the portion of the PI-27E site vicinity which overlaps Site LF-1E.

Grey Fox (*Urocyon cineroargenteus*)

Although the present status of this species in Niagara R.M. is not known, the Grey Fox is probably rare and confined to deciduous riparian woodland. It has recently been reported from the Lyons Creek valley (Acres Consulting Services Limited 1978). The exact location is unknown and may not pertain to that portion of Lyons Creek which falls within the PI-27E site vicinity.

Early historical accounts and archaeological excavations indicate that the Grey Fox was once common in southern Ontario as far north as Simcoe County (Wintemberg 1921; Peterson et al. 1953). The species was apparently extirpated from the northern limit of its range for a period of approximately 300 years, and only reappeared in Ontario in the middle of this century. According to Banfield (1974), Grey Foxes re-entered Ontario from New York via the Niagara River in 1948.

Based on a status report prepared by Steers (1978), the Grey Fox was officially designated as "rare" in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1979.

5.5.2 RARE PLANT SPECIES:

Four species in the site vicinity are rare, based upon documented sources.

Three of the rare plants are trees, two of which, Pin Oak and Tupelo (*Nyssa sylvatica*), occur in wet and wet-mesic habitats. The third, Pignut Hickory (*Carya glabra*), is characteristic of drier sites.

Pin Oak

The status of Pin Oak is discussed in greater detail in Section 4.4.3. It is considered to be rare in Ontario and Canada, but is not rare in the Niagara Frontier Region (Zander and Pierce 1979). Two stations of Pin Oak occur in that portion of the PI-27E site vicinity which overlaps Site LF-1E.

Tupelo

Tupelo is considered rare in Ontario and Canada (Argus and White 1977) but not in the Niagara Frontier Region (Zander and Pierce 1979). Its status is currently under review by the Atlas of Rare Vascular Plants of Ontario Program in Ottawa. Tupelo has been recorded in the Ramsey Road Woodlot by Meyers (1984).

Pignut Hickory

This species is considered rare in Ontario and Canada (Argus and White 1977), but is not designated as rare in the Niagara Frontier Region (Zander and Pierce 1979).

Pignut Hickory is recorded from the Horse Track Woodlot, Young Woodlot, Willoughby Marsh and Ramsey Road Woodlot ESAs (Brady *et al*. 1980a).

Southern Arrow-wood (*Viburnum recognitum*)

This shrub species, is found along the southwest edge of the site vicinity, where it overlaps with Site LF-1E. Southern Arrow-wood is designated as rare in Canada (Argus and Keddy, undated).

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information, as summarized in Table 4, provides background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources PI-27E

FACTORS AND INDICATORS

SIGNIFICANT ENVIRONMENTAL UNITS			FISH AND WILDLIFE FEATURES OF SIGNIFIFANCE		OTHER NATURAL VEGETATION	RARE SPECIES
SEU	CRITERIA FOR DESIGNATION	DISTANCE TO SITE	FEATURES	DISTANCE TO SITE		
• 13-2 • Cyanamid Corners • Brady ESA Study • 169 ha*	• water recharge area • abundant wildlife • rare plant species • range of successional stages	500 m	• locally significant pike spawning - Grassy Brook	-flows from site into site vicinity	• Deciduous Forest 191 ha • Mixed Forest 8ha • Coniferous Forest 11ha • Thicket 45ha • Wetland 41ha • Successional Field 69ha	ANIMALS • Northern Bobwhite • Acadian Flycatcher • Eastern Bluebird • Yellow-breasted Chat • Opossum • Grey Fox PLANTS • Pin Oak • Tupelo • Pignut Hickory • Southern Arrow-wood
• 13-3 • Ramsey Rd. Woodlot • Brady ESA Study • 19 ha*	• rare plant species	1.25 km	- Tea Creek	•1.2 km		
• 13-5 • Welland River • Niagara Region Policy Plan • 35 ha*	• unknown	Directly adjacent to northwest corner				
• 13-6 • Lyons Creek • Niagara Region Official Plan • MNR AIBR • 10ha*	• waterfowl production • waterfowl staging • pike spawning area • breeding/feeding habitat for a provincially significant animal species	750 m				
• 13-8 • Willoughby Marsh • Brady ESA Study • 5 ha*	• distinctive landforms • water recharge area • remnant wetland • rare plant species • wildlife habitat	2 km				
• 19-2 • Horse Track Woodlot • Brady ESA Study • 45 ha *	• rare plant species	600 m				
• 19-3 • Young Woodlot • Brady ESA Study • 2 ha*	• rare plant species	1.25 km				

NOTE: * area of SEU within site vicinity

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7.0 SPECIES LIST

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 9) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins *et al*. 1982) and fish (Scott and Crossman 1973).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 9. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined; these are sources 1, 6, 14 and 43.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

The most current source of information concerning plant status and distribution in Niagara Region is Flora of the Niagara Frontier Region (Zander and Pierce 1979). Although prepared in New York State, the study area includes Niagara Region in Ontario. It draws upon Ontario literature and provides an accurate reflection of regional plant status.

Other background reports examined included works by Zenkert (1934) and Zander (1976) for the Niagara Frontier Region. Environmentally Sensitive Areas reports by Brady *et al*. (1980a), Ecologistics Limited (1976) and Eagles *et al*. (1980) provided additional regional perspectives for plant species distribution and status. The Vascular Plants of Norfolk County (Landon 1960) provided regional data for an adjacent area.

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reports where applicable.

Frequency and relative abundance standards are assigned to Ontario birds by James *et al*. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for a comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

Two annotated lists of the regonal avifauna were relied upon heavily when determining the status of birds in the Niagara Peninsula. The geographical scope of Beardslee and Mitchell's (1965) account encompasses a large portion of neighbouring New York State, while Sheppard's (1970) treatment is confined to the Ontario side. Previous published lists (Sheppard _et al_. 1936; Sheppard 1939) contain references to the historical status of selected species.

In assigning status, Beardslee and Mitchell (1965) adopt the criteria and terms established by the Federation of New York State Bird Clubs in 1954. These differ somewhat from the criteria used by James _et al_. (1976) to determine status on a provincial level. Terms used by Sheppard (1970) to describe abundance and frequency of occurrence are not defined.

More recent information on the status of breeding birds in the various regions was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April 1984, 20 species of mammals have been designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not adressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammal fauna of the Regional Municipality of Niagara. Information supplied by local naturalists and recognized authorities in the field of mammalogy was largely relied upon to determine the regional status of particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and South Wellington Counties was also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date, however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from the Niagara Region, however they do not assign status. A survey of the amphibians and reptiles of the Niagara Escarpment Planning Area (Campbell 1976) also includes references to Niagara.

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister *et al*. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species, is presently protected in Ontario by "Endangered" species legislation (Ontario Government 1971; OMNR 1977). The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disproportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitative definitions of rarity could be proposed with a considerable degree of confidence. However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of Guelph, and the National Museum of Natural Sciences in Ottawa, were consulted on a number of occassions.

In cases where wildlife data were lacking, lengthy discussions were held wth appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the obseration are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE PI-27E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
EQUISETACEAE	HORSETAIL FAMILY		
Equisetum arvense L.	Field Horsetail		1
OSMUNDACEAE	ROYAL FERN FAMILY		
Osmunda regalis L.	Royal Fern		14
ASPLENIACEAE	SPLEENWORT FAMILY		
Onoclea sensibilis L.	Sensitive Fern	1	14
Polystichum acrostichoides (Michx.) Schott	Christmas Fern	1	
PINACEAE	PINE FAMILY		
Pinus banksiana Lam.	Jack Pine		2,5,38
P. strobus L.	White Pine		2,5,8, 38,42
P. sylvestris L.	Scot's Pine		2
Tsuga canadensis (L.) Carr.	Eastern Hemlock		42
TYPHACEAE	CATTAIL FAMILY		
Typha latifolia L.	Cattail	1	
SPARGANIACEAE	BUR-REED FAMILY		
Sparganium eurycarpum Engelm.	Giant Bur-reed	1	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ALISMATACEAE	WATER-PLANTAIN FAMILY		
Alisma plantago-aquatica L.	Water-plantain		14
Sagittaria latifolia Willd.	Arrowhead	1	
POACEAE	GRASS FAMILY		
Diplachne acuminata Nash	Sprangletop		11
Glyceria striata (Lam.) A.S. Hitchc.	Fowl Manna Grass	1	14
Phragmites australis (Cav.) Trin. ex Steudel	Common Reed		1
Tridens flavus (L.) A.S. Hitchc.	Purpletop		11
Elymus virginicus L.	Virginia Wild-rye	1	
Cinna arundinacea L.	Stout Wood Grass	1	14
Phleum pratense L.	Timothy	1	
Muhlenbergia asperifolia (Nees & Meyen ex Trin.) Parodi	Scratch Grass		11
Sporobolus vaginiflorus (Torrey) A. Wood	Ensheathed Dropseed		10
Oryzopsis racemosa (Sm.) Ricker	Mountain-rice	1	
Phalaris arundinacea L.	Reed Canary Grass	1	1
Panicum capillare L.	Witch Grass	1	
P. dichotomiflorum Michx.	Fall Panic Grass		11
Setaria faberie W. Herrmann	Giant Foxtail		11
S. glauca (L.) Beauv.	Yellow Foxtail		1
S. viridis (L.) Beauv.	Green Foxtail		1

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CYPERACEAE	SEDGE FAMILY		
Cyperus speciosus Vahl.	Michaux's Cyperus		10
C. strigosus L.	Nut Grass	1	
Scirpus americanus Pers.	Three-square Rush	1	
S. cyperinus (L.) Kunth.	Wool-grass	1	
Eleocharis obtusa (Willd.) Schult.	Blunt Spike-rush	1	10
Carex blanda Dewey.	Sedge		14
C. lupulina Muhl. ex Willd.	Sedge	1	
C. plantaginea Lam.	Sedge	1	
C. platyphylla Carey.	Sedge	1	
C. vulpinoidea Michx.	Sedge	1	
ARACEAE	ARUM FAMILY		
Arisaema triphyllum (L.) Torr.	Jack-in-the-pulpit	1	5,39,40, 41
PONTEDERIACEAE	PICKEREL-WEED FAMILY		
Pontederia cordata L.	Pickerel-weed		4,7
JUNCACEAE	RUSH FAMILY		
Juncus effusus L.	Soft Rush	1	
J. gerardi Lois.	Black-grass		12
J. nodosus L.	Rush	1	
LILIACEAE	LILY FAMILY		
Uvularia sessilifolia L.	Sessile-leaved Bellwort	1	14
Allium canadense L.	Meadow Garlic		13
Trillium grandiflorum (Michx.) Salisb.	Large-flowered Trillium	1	
Smilax herbacea L.	Carrionflower	1	
S. tamnoides L. var. *hispida* (Muhl.) Fern.	Bristly Catbrier		14

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	VICINITY
SALICACEAE	WILLOW FAMILY		
Populus deltoides Marsh.	Eastern Cottonwood		5,40
P. grandidentata Michx.	Large-toothed Aspen		5,38,39, 40,42
P. tremuloides Michx.	Trembling Aspen	1	5,38,40, 41,42
Salix amygdaloides Anderss.	Peach-leaved Willow		5,40
S. babylonica L.	Weeping Willow		41
S. discolor Muhl.	Pussy Willow		5,41
S. nigra Marsh.	Black Willow		5,39,40, 41,42
JUGLANDACEAE	WALNUT FAMILY		
Juglans cinerea L.	Butternut		5,39
J. nigra L.	Black Walnut	1	2,5,39
Carya cordiformis (Wang.) K. Koch.	Bitternut Hickory		5,39,41, 42
C. glabra (Mill.) Sweet *	Pignut Hickory		5,40,41, 42
C. ovata (Mill.) K. Koch.	Shagbark Hickory	1	5,14,38, 39,40,41
BETULACEAE	BIRCH FAMILY		
Carpinus caroliniana Walt.	Blue Beech	1	5,14,38, 39,40,41, 42
Ostrya virginiana (Mill.) K. Koch.	Hop Hornbeam	1,2	5,14,38, 39,40,41, 42
Betula allegheniensis Britt.	Yellow Birch		5,40,41
B. papyrifera Marsh.	Paper Birch		5,8,2, 38,42
Corylus cornuta Marsh.	Beaked Hazel		5,40
Alnus incana (L.) Muench ssp. *rugosa* (Du Roi) Clausen	Speckled Alder		5,40

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech	1,2,9	2,5,14, 39,40,41, 42
Quercus alba L.	White Oak	1,2	2,5,14, 38,39,40, 42
Q. bicolor Willd.	Swamp White Oak	1	3,5,39, 40,41,42
Q. muehlenbergii Engelm.	Chinquapin Oak		5,39
Q. palustris Muenchh. *	Pin Oak	1	3,5,14, 39,40,41
Q. rubra L.	Red Oak	43,9, 1,2	5,2,14, 40,42
Q. velutina Lam.	Black Oak		5,38,40, 42
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	1,2	5,14,38, 39,40,42
U. rubra Muhl.	Slippery Elm		5,38,40, 41
U. thomasii Sarg.	Cork Elm		5,38,40, 41,42
MORACEAE	MULBERRY FAMILY		
Maclura pomifera (Raf.) Schneid.	Osage-orange		5,39
URTICACEAE	NETTLE FAMILY		
Urtica dioica L. var. *procera* (Muhl.) Wedd.	Tall Nettle	1	
Laportea canadensis (L.) Wedd.	Wood Nettle	1	14
Boehmeria cylindrica (L.) Schwein.	False Nettle	1	14

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex crispus L.	Curled Dock		1
Polygonum cuspidatum Sieb. & Zucc.	Japanese Knotweed	1	
P. lapathifolium L.	Pale Smartweed		1
P. punctatum Ell.	Water Smartweed	1	
P. saggitatum L.	Arrow-leaved Smartweed		1
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium botrys L.	Jerusalem Oak		10
NYCTAGINACEAE	FOUR-O'CLOCK FAMILY		
Mirabilis nyctaginea (Michx.) MacM.	Umbrella-wort		25
RANUNCULACEAE	BUTTERCUP FAMILY		
Hepatica americana (DC.) Ker.	Blunt-leaved Hepatica		14
Thalictrum dioicum L.	Early Meadow Rue		14
BERBERIDACEAE	BARBERRY FAMILY		
Podophyllum peltatum L.	May-apple		5,14,39, 40,41,42
LAURACEAE	LAUREL FAMILY		
Lindera benzoin (L.) Blume	Spicebush		41

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CRASSULACEAE	SEDUM FAMILY		
Sedum triphyllum (Haw.) S.F. Gray	Orpine	1	
Penthorum sedoides L.	Ditch-stonecrop	1	
SAXIFRAGACEAE	SAXIFRAGE FAMILY		
Tiarella cordifolia L.	Foam Flower		14
HAMAMELIDACEAE	WITCH-HAZEL FAMILY		
Hamamelis virginiana L.	Witch-hazel		5,14,38, 40,41,42
ROSACEAE	ROSE FAMILY		
Spirea alba Du Roi	Narrow-leaved Meadowsweet	1	14
Malus coronaria Rydb.	Wild Crabapple	3	
M. domestica Borkh.	Apple		5,39,40, 41
Amelanchier laevis Wieg.	Smooth Serviceberry		14
Crataegus calpodendron (Ehrh.) Medic.	Hawthorn	1	
C. pruinosa (Wendl.) K. Koch.	Hawthorn	1	
Rubus allegheniensis Porter	Common Blackberry	1	
R. idaeus L. var. *strigosus* (Michx.) Maxim.	Wild Red Raspberry	1	1
Fragaria virginiana Dene.	Strawberry	1	
Geum rivale L.	Purple Avens	1	
R. palustris Marsh.	Swamp Rose		14
Prunus pensylvanica L. fil.	Pincherry		39
P. serotina Ehrh.	Black Cherry	1	2,5,14, 38,39,40, 41,42
P. virginiana L.	Choke Cherry		39

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
FABACEAE	PEA FAMILY		
Gleditsia tricanthos L.	Honey-locust		41
Melilotus alba Desr.	White Sweet-clover		*1*
Trifolium pratense L.	Red Clover	*1*	
Robinia pseudoacacia L.	Black Locust		5,39
GERANIACEAE	GERANIUM FAMILY		
Geranium maculatum L.	Wild Geranium	*1*	*14*
POLYGALACEAE	MILKWORT FAMILY		
Polygala cruciata L.	Marsh Milkwort		25
ANACARDIACEAE	CASHEW FAMILY		
Rhus radicans L.	Poison Ivy	*1*	*14*
R. typhina L.	Staghorn Sumac		5,38,39,40,41
AQUIFOLIACEAE	HOLLY FAMILY		
Ilex verticillata (L.) Gray	Winterberry		*14*
ACERACEAE	MAPLE FAMILY		
Acer negundo L.	Manitoba Maple		41
A. nigrum Michx. f.	Black Maple		5,39,40,41,42
A. rubrum L.	Red Maple	*1*	4,5,*14*,40,41
A. saccharinum L.	Silver Maple		4,5,*14*,39,40,41,42
A. saccharum Marsh.	Sugar Maple	*1*,2,9	2,4,5,*14*,38,39,40,41,42
A. spicatum Lam.	Mountain Maple		5,39,42

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BALSAMINACEAE	JEWEL-WEED FAMILY		
Impatiens biflora Walt.	Spotted Jewelweed	1	1,14
RHAMNACEAE	BUCKTHORN FAMILY		
Rhamnus cathartica L.	Buckthorn		5,41
VITACEAE	GRAPE FAMILY		
Vitis riparia Michx.	Wild Grape	1	
Parthenocissus vitacea (Knerr.) Hitchc.	Virginia Creeper	1	
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	1	2,5,14, 38,39,40, 41,42
MALVACEAE	MALLOW FAMILY		
Abutilon theophrasti Medic.	Indian Mallow		25
Hibiscus palustris L. *	Swamp Rose Mallow	3	
NYSSACEAE	SOUR GUM FAMILY		
Nyssa sylvatica Marsh.*	Tupelo		3
ONAGRACEAE	EVENING-PRIMROSE FAMILY		
Ludwigia polycarpa Short & Peter. *	Many-fruited Ludwigia	1	
Epilobium angustifolium L.	Fireweed	1	25
Oenothera biennis L.	Hairy Yellow Evening-primrose	1	
Circaea quadrisulcata (Maxim.) Franch. & Sav.	Enchanter's Nightshade	1	14

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ADIACEAE	CARROT FAMILY		
Daucus carota L.	Wild Carrot	1	1
CORNACEAE	DOGWOOD FAMILY		
Cornus alternifolia L. fil.	Alternate-leaved Dogwood		5,39,40
C. florida L.	Flowering Dogwood		5,38
C. racemosa Lam.	Gray Dogwood		1,5,40,41
C. stolonifera Michx.	Red Osier	1	
C. stolonifera var. *baileyi*	Dogwood		25
PYROLACEAE	WINTERGREEN FAMILY		
Monotropa hypopithys L.	Pinesap		14
ERICACEAE	HEATH FAMILY		
Gaultheria procumbens L.	Wintergreen		14
Vaccinium corymbosum L.	Highbush Blueberry	1	
PRIMULACEAE	PRIMROSE FAMILY		
Samolus floribundus H.B.K. *	Brookweed	1	
Lysimachia nummularia L.	Moneywort	1	
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash	43,1	2,5,38,39,40,41,42
F. nigra Marsh.	Black Ash	1,3	2,5,39
F. pennsylvanica Marsh.	Red Ash	1	4,38,39,40,41,42

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
ASCLEPIADACEAE	MILKWEED FAMILY		
Asclepias syriaca L.	Common Milkweed		1
CONVOLVULACEAE	MORNING-GLORY FAMILY		
Convolvulus arvensis L.	Field Bindweed	1	
POLEMONIACEAE	PHLOX FAMILY		
Phlox divaricata L.	Wild Blue Phlox		1
LAMIACEAE	MINT FAMILY		
Glechoma hederacea L.	Ground Ivy	1	14
Prunella vulgaris L.	Heal-all	1	14
SOLANACEAE	NIGHTSHADE FAMILY		
Datura stramonium L.	Jimson-weed		25
Solanum carolinense L.	Horse-nettle		25
S. nigrum L.	Black Nightshade		25
S. dulcamara L.	Climbing Nightshade	1	14
SCROPHULARIACEAE	FIGWORT FAMILY		
Verbascum thapsus L.	Common Mullein		1
Linaria vulgaris Mill.	Yellow Toadflax		1
OROBANCHACEAE	BROOM-RAPE FAMILY		
Epifagus virginiana (L.) Bart.	Beech-drops	1	14
PHRYMACEAE	LOPSEED FAMILY		
Phryma leptostachya L.	Lopseed		14

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
PLANTAGINACEAE	PLANTAIN FAMILY		
Plantago major L.	Broad-leaved Plantain		1
RUBIACEAE	MADDER FAMILY		
Cephalanthus occidentalis L.	Buttonbush	1	1,7,14, 38, 6
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Sambucus canadensis L.	Common Elder	1	1
Viburnum lentago L.	Nannyberry	1	5,39
V. recognitum Fern. *	Southern Arrow-wood		14
DIPSACACEAE	TEASEL FAMILY		
Dipsacus fullonum L.	Teasel		1
CAMPANULACEAE	HAREBELL FAMILY		
Lobelia cardinalis L.	Cardinal-flower	1	7

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
ASTERACEAE	ASTER FAMILY		
Eupatorium altissimum L.	Tall Thoroughwort		10
E. perfoliatum L.	Boneset	1	
Solidago canadensis L.	Canada Goldenrod	1	1
S. nemoralis Ait.	Gray Goldenrod	1	43,1
S. rugosa Ait.	Rough Goldenrod	1	
Conyza canadensis (L.) Cronq.	Horseweed		1
Aster brachyactis Blake	Rayless Aster		2
A. cordifolius L.	Heart-leaved Aster	1	14
A. novae-angliae L.	New England Aster	1	1
A. pilosus Willd. *	Spray Aster	1	
A. simplex Willd.	Panicled Aster	1	
Ambrosia artemisiifolia L.	Common Ragweed	1	1
Bidens cernua L.	Nodding Beggar-ticks	1	
B. connata Muhl.	Devil's Beggar-ticks	1	14
Artemisia vulgaris L.	Common Mugwort		25
Arctium minus (Hill.) Bernh.	Common Burdock	1	
Centaurea nigra L.	Black Knapweed		1
Cichorium intybus L.	Chickory	1	
Taraxacum officinale Weber	Dandelion		1
Hieracium aurantiacum L.	Orange Hawkweed		40

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
BRYOPHYTES			
FISSIDENTACEAE			
Fissidens taxifolius Hedw.		1	
CLIMACIACEAE			
Climacium dendroides (Hedw.) Web. & Mohr		1	
POLYTRICHACEAE			
Atrichum angustatum (Brid.) B.S.G.		1	

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* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5)

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE PI-27E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
American Bittern	*Botaurus lentiginosus*		16
Great Blue Heron	*Ardea herodias*	26	15,16,19, 41
Green-backed Heron	*Butorides striatus*		15,16,38
Black-crowned Night-Heron	*Nycticorax nycticorax*		7
Tundra Swan	*Cygnus columbianus*		19
Canada Goose	*Branta canadensis*		19,20,27
Wood Duck	*Aix sponsa*		7
American Black Duck	*Anas rubripes*		16
Mallard	*Anas platyrhynchos*		15,16
Blue-winged Teal	*Anas discors*		16
Turkey Vulture	*Cathartes aura*		15,22
Northern Harrier	*Circus cyaneus*	1	
Sharp-shinned Hawk	*Accipiter striatus*		16
Red-tailed Hawk	*Buteo jamaicensis*	19,6	15,16,38, 41
American Kestrel	*Falco sparverius*		15,16
Ring-necked Pheasant	*Phasianus colchicus*		15,16,13
Ruffed Grouse	*Bonasa umbellus*		15,16,38, 40,41,42
Northern Bobwhite	*Colinus virginianus* *		17
Sora	*Porzana carolina*		16,17,7
American Coot	*Fulica americana*		22
Killdeer	*Charadrius vociferus*	1	15,16,38, 41
Lesser Yellowlegs	*Tringa flavipes*		16
Solitary Sandpiper	*Tringa solitaria*		16
Spotted Sandpiper	*Actitis macularia*		15,16
Upland Sandpiper	*Bartramia longicauda*		15,41
Common Snipe	*Gallinago gallinago*		15
American Woodcock	*Scolopax minor*		16,41
Ring-billed Gull	*Larus delawarensis*		15,16
Herring Gull	*Larus argentatus*		16
Caspian Tern	*Sterna caspia*		15
Common Tern	*Sterna hirundo*		15,16
Rock Dove	*Columba livia*	1	15
Mourning Dove	*Zenaida macroura*		15,16,27
Black-billed Cuckoo	*Coccyzus erythrophthalmus*		15
Great Horned Owl	*Bubo virginianus*	6	15

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Short-eared Owl	*Asio flammeus*		16
Common Nighthawk	*Chordeiles minor*		15
Chimney Swift	*Chaetura pelagica*		15
Ruby-throated Hummingbird	*Archilochus colubris*		15,16
Belted Kingfisher	*Ceryle alcyon*		15,16
Red-headed Woodpecker	*Melanerpes erythrocephalus*		15,16
Downy Woodpecker	*Picoides pubescens*	1,43	15,16
Hairy Woodpecker	*Picoides villosus*		15,16
Northern Flicker	*Colaptes auratus*	1	15,16
Pileated Woodpecker	*Dryocopus pileatus*	1	
Eastern Wood-Pewee	*Contopus virens*		15,16
Acadian Flycatcher	*Empidonax virescens* *		17
Alder Flycatcher	*Empidonax alnorum*		17
Willow Flycatcher	*Empidonax traillii*		15
Eastern Phoebe	*Sayornis phoebe*		16
Great Crested Flycatcher	*Myiarchus crinitus*		15,16
Eastern Kingbird	*Tyrannus tyrannus*		15,16
Horned Lark	*Eremophila alpestris*		15,16
Purple Martin	*Progne subis*		15,16
Tree Swallow	*Tachycineta bicolor*		15,16
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		16
Bank Swallow	*Riparia riparia*		16
Barn Swallow	*Hirundo rustica*		15,16
Blue Jay	*Cyanocitta cristata*	1,6,43	15,16
American Crow	*Corvus brachyrhynchos*	1,6	15,16
Black-capped Chickadee	*Parus atricapillus*	1,43	15,16
White-breasted Nuthatch	*Sitta carolinensis*	1	15,16
House Wren	*Troglodytes aedon*		15
Marsh Wren	*Cistothorus palustris*		17
Golden-crowned Kinglet	*Regulus satrapa*		16
Eastern Bluebird	*Sialia sialis* *		21
Veery	*Catharus fuscescens*		16
Wood Thrush	*Hylocichla mustelina*		16
American Robin	*Turdus migratorius*	1	15,16,21
Gray Catbird	*Dumetella carolinensis*	1	15,16
Northern Mockingbird	*Mimus polyglottos*		17
Brown Thrasher	*Toxostoma rufum*		15,16
Cedar Waxwing	*Bombycilla cedrorum*	1	15,16
European Starling	*Sturnus vulgaris*	1	15,16

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Yellow-throated Vireo	*Vireo flavifrons*		17
Warbling Vireo	*Vireo gilvus*		15
Red-eyed Vireo	*Vireo olivaceus*		15,16
Nashville Warbler	*Vermivora ruficapilla*		16
Yellow Warbler	*Dendroica petechia*		15,16
Chestnut-sided Warbler	*Dendroica pensylvanica*		16
Magnolia Warbler	*Dendroica magnolia*		16
Cape May Warbler	*Dendroica tigrina*		16
Black-throated Blue Warbler	*Dendroica caerulescens*		16
Yellow-rumped Warbler	*Dendroica coronata*		16
Black-throated Green Warbler	*Dendroica virens*		16
Blackburnian Warbler	*Dendroica fusca*		16
Bay-breasted Warbler	*Dendroica castanea*		16
Blackpoll Warbler	*Dendroica striata*		16
Black-and-white Warbler	*Mniotilta varia*		16
Common Yellowthroat	*Geothlypis trichas*		15
Yellow-breasted Chat	*Icteria virens* *		15
Scarlet Tanager	*Piranga olivacea*		15
Northern Cardinal	*Cardinalis cardinalis*		15,16,18,22,27,43
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		15,16
Indigo Bunting	*Passerina cyanea*		15
Rufous-sided Towhee	*Pipilo erythrophthalmus*		15,16
American Tree Sparrow	*Spizella arborea*	6	16
Chipping Sparrow	*Spizella passerina*		15,16
Field Sparrow	*Spizella pusilla*		15,16
Grasshopper Sparrow	*Ammodramus savannarum*		15
Song Sparrow	*Melospiza melodia*		15,16,41
White-crowned Sparrow	*Zonotrichia leucophrys*	6	16
Dark-eyed Junco	*Junco hyemalis*		16
Bobolink	*Dolichonyx oryzivorus*		15,41
Red-winged Blackbird	*Agelaius phoeniceus*	1,43	15,16,38,39,41,42
Eastern Meadowlark	*Sturnella magna*		15,16
Common Grackle	*Quiscalus quiscula*	1	15,16
Brown-headed Cowbird	*Molothrus ater*		15,16
Northern Oriole	*Icterus galbula*		15,16
Common Redpoll	*Carduelis flammea*		16

TABLE 6 (cont'd)

COMMON NAME	LATIN NAME	OCCURRENCE AND SOURCES SITE	VICINITY
American Goldfinch	*Carduelis tristis*		15,16,21, 38
Evening Grosbeak	*Coccothraustes vespertinus*		16
House Sparrow	*Passer domesticus*	6	15,16

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE PI-27E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Opossum	*Didelphis virginiana* *	18	20,24,27
Masked Shrew	*Sorex cinereus*		16
Short-tailed Shrew	*Blarina brevicauda*		16
Hairy-tailed Mole	*Parascalops breweri*		16
Star-nosed Mole	*Condylura cristata*		16
Eastern Cottontail	*Sylvilagus floridanus*	18	20,21,16, 40,41,42
Eastern Chipmunk	*Tamias striatus*		16
Woodchuck	*Marmota monax*	18	16,42
Grey Squirrel	*Sciurus carolinensis*		16,39,41, 42
American Red Squirrel	*Tamiasciurus hudsonicus*		16
Deer Mouse	*Peromyscus maniculatus*		16
White-footed Mouse	*Peromyscus leucopus*		16
Muskrat	*Ondatra zibethicus*	4	28,4,7,16, 40
Meadow Vole	*Microtus pennsylvanicus*		16
Meadow Jumping Mouse	*Zapus hudsonius*		16
Coyote	*Canis latrans*		13
Red Fox	*Vulpes vulpes*		20,13,23, 27,16
Grey Fox	*Urocyon cinereoargenteus* *		16
Raccoon	*Procyon lotor*	4	28,4,7, 16,41
Long-tailed Weasel	*Mustela frenata*		16
American Mink	*Mustela vison*		7,16
White-tailed Deer	*Odocoileus virginianus*	18,1, 26	20,13,23, 16,38,40, 41,42,43

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE PI-27E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Eastern American Toad	*Bufo a. americanus*	1,43	
Gray Treefrog	*Hyla versicolor*		41
Bullfrog	*Rana catesbeiana*		7
Green Frog	*Rana clamitans*	1	
Northern Leopard Frog	*Rana pipiens*	1	
Common Snapping Turtle	*Chelydra s. serpentina*		29
Northern Brown Snake	*Storeria d.dekayi*		39

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE PI-27E AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Central Mudminnow	Umbra limi		16
Northern Pike	Esox lucius	31	13,30,27, 31,16,9, 37,29
Goldfish	Carassius auratus		36
Carp	Cyprinus carpio		35,36,16
Golden Shiner	Notemigonus crysoleucas		34,16
Emerald Shiner	Notropis atherinoides		34,16
Common Shiner	Notropis cornutus		35
Spottail Shiner	Notropis hudsonius		34,16
Bluntnose Minnow	Pimephales notatus		2,33,34, 16
Creek Chub	Semotilus atromaculatus		16
White Sucker	Catostomus commersoni		16
River Redhorse	Moxostoma carinatum		36
Brown Bullhead	Ictalurus nebulosus		36,16
Channel Catfish	Ictalurus punctatus		36
Tadpole Madtom	Noturus gyrinus		34,16
Banded Killifish	Fundulus diaphanus		34
White Bass	Morone chrysops		35
Rock Bass	Ambloplites rupestris		22,32,33, 34,35,36, 16
Pumpkinseed	Lepomis gibbosus		34,35, 36,16
Smallmouth Bass	Micropterus dolomieui		35
Largemouth Bass	Micropterus salmoides		31
Black Crappie	Pomoxis nigromaculatus		34,35,16
Yellow Perch	Perca flavescens		22,35,36, 16
Rainbow Darter	Etheostoma caeruleum		34

DATA SOURCES FOR TABLES 5-9

1. Gartner Lee Associates Limited, 1984a.
2. Ontario Ministry of Natural Resources, 1979a,b.
3. Meyers, 1984.
4. Ontario Ministry of Natural Resources, 1984g.
5. Brady et al., 1980a.
6. Gartner Lee Associates Limited, 1984b.
7. Ontario Ministry of Natural Resources, 1984e.
8. Ontario Ministry of Natural Resources, 1984h.
9. Ontario Ministry of Natural Resources, 1984a.
10. McIntosh and Catling, 1979.
11. Catling et al., 1977.
12. Catling and McKay, 1980.
13. Merritt and Merritt, 1984.
14. Gartner Lee Associates Limited, 1984c.
15. Ontario Breeding Bird Atlas, 1984.
16. Acres Consulting Services Limited, 1978.
17. Knapton and Foley, 1984.
18. McGrath, 1984.
19. Whiteman, 1984.
20. Pietrangelo, Ms. D., 1984.

DATA SOURCES FOR TABLES 5-9 (cont'd)

21. Sider, 1984.

22. Stirling, 1984.

23. Pietrangelo, Mr. D., 1984.

24. Hamilton, 1984.

25. Yaki, 1970.

26. Cook, 1984.

27. Warner, A., 1984.

28. Stewart, 1984.

29. Orr, 1984.

30. Gerryts, 1984.

31. Ontario Ministry of Natural Resources, 1984c.

32. Ontario Ministry of Natural Resources, 1976a.

33. Ontario Ministry of Natural Resources, 1976b.

34. Ontario Ministry of Natural Resources, 1974a.

35. Ontario Ministry of Natural Resources, 1974b.

36. Brock University, 1981.

37. Ontario Ministry of Natural Resources, 1984d.

38. Brady _et al_., 1980b.

39. Brady _et al_., 1980c.

DATA SOURCES FOR TABLES 5-9 (cont'd)

40. Brady _et al._, 1980d.

41. Brady _et al._, 1980e.

42. Brady _et al._, 1980f.

43. Gartner Lee Associates Limited, 1984d.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site PI-27E from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 10. Interview numbers are related to identifications assigned by Ecologistics Ltd. during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview form are contained in Table 11. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

During conversations with landowners regarding permission to conduct field work on their properties, we followed up on questions which arose from a review of "Walk-and-Talk" interview data. Table 12 is an example of a completed "Public Contact - Local Data Collection" form which records such a follow up conversation.

Completed "Public Contact - Local Data Collection" forms are on file at Gartner Lee Associates Limited. Table 13 is a summary of information arising from these follow up contacts.

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. J. Merritt	14-2-126	PI-27E (SV)	109-1	- pheasants, ducks, coyote, deer, fox - harvest pike, strawberries, wild garlic
Ms. D. Pietrangelo	14-2-81-4	PI-27E (SV)	212-1a-2	- deer, opossum, woodpecker - rabbits live in woodlot
Mr. Tibor Palatine	14-2-107 13-4-189 13-4-5	PI-27E (S)	284	- none
	13-4-149 13-4-150 13-4-147 13-4-144	PI-27E (SV)		- none
Mr. & Mrs. Charles Warner	14-2-118 14-2-50 14-2-113	PI-27E (S)	48-2	- harvest fuelwood and wild strawberries
	14-2-114 14-2-47	PI-27E (SV)		
Mr. John Grassl	14-2-108	PI-27E (S)	183	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Charles Cook	14-2-122	PI-27E (S)	66-1	- blue heron
Mr. Harold Warner	14-2-117	PI-27E (S)	93-1	- owls in the area
Mr. & Mrs. B. McGrath	14-2-120	PI-27E (S)	68-1	- groundhog, deer, rabbits, opossum - harvest trout from stream, and wild strawberries
Mr. & Mrs. E. Hamilton	14-2-75	PI-27E (SV)	529-G	- opossum
Ms. D. Pietrangelo	14-2-81	PI-27E (SV)	212-1a-1	- deer, fox, opossum, Canada Geese migration route
Mr. J. Sider	13-4-16	PI-27E (SV)	211-1	- rabbits, bluebirds and other birds - harvest wild berries
Mr. & Mrs. J. Stirlings	14-2-125	PI-27E (SV)	101-1	- mudhens and other birds - fishing for Rock Bass and Perch in Chippawa Creek - vegetable garden

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. D. Pietrangelo	14-2-81-1	PI-27E (SV)	213-1a	- deer, fox, falcon and Crane - fuelwood - hunting - harvest wild mushrooms
	14-2-81-2			
Mr. L. Fiorentino	13-4-14	PI-27E (SV)	41-2	- none
Mr. Donald Mannell	14-2-123		147-2	- none
	14-2-91			
	14-2-83	LF-1E		
	14-2-84	(SV)		
	14-2-94			
	14-2-97			
	14-2-95			
Mr. Archie Warner	14-2-115		25-2	- foxes throughout - opossums in barn - pike used to be in stream - mourning doves, cardinals - ducks nest in woodlot on 14-2-87 - harvest wild strawberries
	14-2-119	LF-1E		
	14-2-87	(SV)		
	14-2-55	LF-1E		
		(S)		

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Ken Biggar	14-2-136 14-2-89	LF-1E (SV)	13-2	- pike and carp in stream - harvests pike
Mr. & Mrs. Roy Vogt	14-2-99	LF-1E (SV)	426	- none
Mr. A. Del Vecchio	14-2-93	LF-1E (SV)	267-1	- none
Mr. Raffaele Butera	14-2-68	LF-1E (SV)	120-2	- none
Mr. & Mrs. John Taylor	14-2-67	LF-1E (S)	111-1	- none
Mr. Bob Tishler	14-2-64	LF-1E (S)	24-1	- none
Mr. Istvan Kovacs	14-2-63 14-2-65	LF-1E (S)	113-1a	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Ernest Damore	14-2-57	LF-1E (S)	28-1	- none
Mr. & Mrs. J. Morris	14-2-50	LF-1E (SV)	71-2	- deer, red fox, opossum, and other mammals - several bird species - sawlogs and fuelwood from woodlot
Mr. J. Majoros	14-2-69 14-2-70 4-1-112 4-1-253 14-2-35	LF-1E (SV)	29-2	- hunt deer in area - maple syrup from 14-2-70 - fuelwood and harvests wild mushrooms from woodlot
Mr. & Mrs. T. Chambers	14-2-25	LF-1E (SV)	4-1	- deer, foxes - fuelwood - harvest elderberries and mushrooms
Mr. Joseph Fekete	14-2-60	LF-1E (S)	117-2	- fox, deer - blue jays, hawks - harvest wild strawberries

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. David Underhill	14-2-60-1	LF-1E (S)	116-2	- fuelwood from woodlot
Mr. Walter Kretz	14-2-61	LF-1E (S)	9-2	- red foxes, deer, rabbits - hunt deer - harvest maple syrup, wild strawberries, elderberries and raspberries
Mr. & Mrs. George Watson	14-2-59	LF-1E (S)	64-1	- raise crayfish in ponds
Mrs. Bruce Silverthorn	14-2-53 14-2-17 14-2-10	LF-1E (S) LF-1E (SV)	245-2	- fuelwood - harvest wild strawberries and maple syrup
Mr. Wilson Silverthorn	14-2-52	LF-1E (S)	IER#2	- none
Mr. Ivan Mamczycz	14-2-23 14-2-23-1 14-2-19	LF-1E (S)	11-2	- deer, foxes, rabbits in corner woodlot - harvest mushrooms, puff balls, strawberries - fuelwood from woodlot

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. Thomas Cowan	14-2-18	LF-1E (S)	17-2	- deer run through property - opossum in area - fuelwood from woodlot - harvest strawberries, raspberries, mushrooms, puff balls, leeks - hunt rabbits
Mr. David Warner	14-2-20 14-2-12	LF-1E (S) LF-1E (SV)	42-2	- fox, deer, wolf
Mr. & Mrs. J. Van Leur	14-2-15	LF-1E (S)	73-2	- pike in stream - harvest wild strawberries
Mr. G.W. Morris	14-2-10-01	LF-1E (SV)	112-2	- deer, opossum, mink and other mammals - birds, reptiles - hunt deer - fuelwood and sawlogs - harvest maple syrup, and wild leeks and mushrooms
Mrs. Rosina Perotta	14-2-8	LF-1E (SV)	509-G	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-27E

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. John Coville	14-2-46	LF-1E (SV)	715	- green heron - harvest elderberries and strawberries

Interview Identification Number: ________

TABLE 11: BIOLOGY QUESTIONS LISTED ON WALK-AND-TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

TABLE 12: EXAMPLE OF A COMPLETED "PUBLIC CONTACT - LOCAL DATA COLLECTION" FORM

3.5 PUBLIC CONTACT - LOCAL DATA COLLECTION

No. 14

CANDIDATE SITE PI-27E

PROPERTY ROLL NUMBER(S) 14-2-120

LANDOWNER:
NAME Mr. McGrath
ADDRESS 8218 Grassy Brook Rd. RR1 Port Robinson Ont

TELEPHONE NUMBER 384-~~98~~ 9789

LANDOWNER CONTACTED BY:
TELEPHONE ✓
MAIL
VISIT

DATE OF CONTACT:
17/09/84 CPH

ISSUE(S) TO DISCUSS: Cardinals - no feeder - small yellow birds - pairs? - no so he could tell

Unusual birds - where? near bush beside.
when? spring + fall
Oppssum - where - bush beside property -
when also in Ford plant. - last week
How many One at a time
Trout from Stream - Grassy Brook? ✓ Yes
when? spring
how many? X
how caught? spear
type of trout? X

TABLE 13: SUMMARY OF FOLLOW-UP INTERVIEW DATA (PI-27E)

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) ON SITE VICINITY (SV)	BIOLOGY COMMENTS
Mr. McGrath	14-2-120	PI-27E (S)	- discussed reports of unusual birds: identified as cardinals and small yellow birds - discussed opossum observations on site and near Ford Plant - discussed "trout" that are speared in Spring in Grassy Brook

9.0 BIOLOGY

SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale, Completed data forms and station location maps are in working files at GLAL.

Table 14 is an example of a completed field data form. It is for station 17 on Site PI-27E.

TABLE 14: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - PI-27E

FIELD INVESTIGATIONS

STATION 17 ROLL 4 PHOTO(S) 18

VEGETATION

VEGETATION ASSOCIATION Du FRI DOMINANTS $\frac{H}{Hi_8\ Mh_2}$

Strata	% Cover	Plot Size	Dominant Species - Sample Collected: (c)
Tree Species >6m	20	5	Quercus rubra Ulmus americana Prunus serotina Fagus grandifolia
Tree Species <6m	20	5	Ostrya virginiana Carya ovata
Shrub Species >1.5 m	1	5	Sambucus canadensis
Shrub Species <1.5 m	15	5	Rubus allegheniensis
Graminoid/Herb Species	1	2	Aster sp (c)
Moss/Lichen Species	—	2	

# Snags/Hectare present → abundant (5-10/ha)

Average Canopy Height: FRI 14m, Field 15m Surface Wetness 0 Vegetation Mapping Change ____

Comments / Rare Or Uncommon Species:

WILDLIFE

Gray Catbird - 1 (c)
Northern Flicker - 1 (c)
White-breasted Nuthatch - 1 (c)
Blue Jay - 2 (c)

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____

Approximate Area ____

Shoreline Conditions ____ Bottom Conditions ____

Fish And Invertebrate Species Observed:

Submergent, Emergent Plant Species:

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

- primarily pole stand; a few specimens 40cm + dbh
- some debris in woods
- a few shotgun shells
- fertilizer bags along stream bank

PI-27E-23) Aster lanceolatus Willd.

photo 17 to SW - 1.3m dbh Quercus rubra

10.0 OWMC PHASE 4A - BIOLOGY FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2

SEPTEMBER, 1984

Gartner Lee Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ■ Markham, Ontario ■ L3P 3J9 ■ 416-477-8400
Telex-06-986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m^2. The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m^2 gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m^2. Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.0 APPENDICES

3.1 SITE ACCESS PERMISSION FORM

No.__________

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ____

____

LANDOWNER:

NAME ____

ADDRESS ____

TELEPHONE NUMBER ______________________________

LANDOWNER CONTACTED BY:

TELEPHONE ____________ DATE OF CONTACT:

MAIL ____________ ________________________

VISIT ____________

PERMISSION TO ENTER PROPERTY:

GRANTED ____________

NOT GRANTED ____________ REASON ____________________

PERMISSION TO COLLECT PLANT SAMPLES:

GRANTED ____________

NOT GRANTED ____________ REASON ____________________

COMMENTS: ____

____

____

____

____

Gartner
Lee
Associates
Limited

Gartner
Lee
Associates
Limited

3.2

FIELD OBSERVATION SHEET | BIOLOGICAL STATIONS : SITE

Candidate Site: ____________________

OWMC 84-S18.2

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Associates
Limited

SITE

A) Background

Air Photos: ____________________

Photographs Taken:

Roll: ________ **Photos:** ____________

Corresponding Maps:

____

____

Observer(s): ____________________

Date Of Visit: ____________________

Time & Duration ____________________

Weather:

Present: ____________________

Previous Day: ____________________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ____________________

Flora: ____________________

Fauna: ____________________

Comments: ____________________

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

- Vegetation Association

Forest:	deciduous	D	Upland = u Lowland = l
	coniferous	C	
	mixed	M	
Thicket:	shrub	T	
Field:	crop land	C	
	recently abandoned	FR	
	old	FO	
	successional	FS	
Others:	marsh	M	
	industrial/residential/manicured	R	
Descriptors:	flooded	(F)	
	cutover and/or recent secondary succession	(C)	
	post-fire succession	(P)	
	grazed	(G)	
	drained	(D)	
	plantation	(Pl)	

- Surface Wetness

dry	0
moist	1
wet	2

Wildlife

- Observation Code

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

- Type

stream	s
pond	p
diffuse ponding and swales	dp

- Permanence

possibly permanent	p
probably intermittent	pi
intermittent	i

- Turbidity

clear	c
cloudy	cl
turbid	t

- Shoreline Conditions

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

- Bottom Conditions

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

SITE ____

FIELD INVESTIGATIONS

STATION ____ ROLL ____ PHOTO(S) ____

VEGETATION

VEGETATION ASSOCIATION ____ FRI DOMINANTS ____

Strata	% Cover	Plot Size	Dominant Species - Sample Collected: (c)
Tree Species >6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species <1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ____

Average Canopy Height: FRI ____, Field ____ Surface Wetness ____ Vegetation Mapping Change ____

Comments / Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____

Approximate Area ____

Shoreline Conditions ____ Bottom Conditions ____

Fish And Invertebrate Species Observed: ____

Submergent, Emergent Plant Species: ____

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

Page ____ of ____

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No. ______

CANDIDATE SITE ______________________

PROPERTY ROLL NUMBER(S) ______________________

____

LANDOWNER:

NAME ______________________

ADDRESS ______________________

TELEPHONE NUMBER ______________________

LANDOWNER CONTACTED BY:

TELEPHONE ______

MAIL ______

VISIT ______

DATE OF CONTACT: ______________________

ISSUE(S) TO DISCUSS:

____

____

____

____

____

____

____

REMARKS:

SKETCH MAP:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees.

CONIFEROUS: forest is composed of 80% or more coniferous trees.

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include Crataegus sp., Cornus racemosa and Spirea alba.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).
Others:
WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including Typha angustifolia and Scirpus atrovirens. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

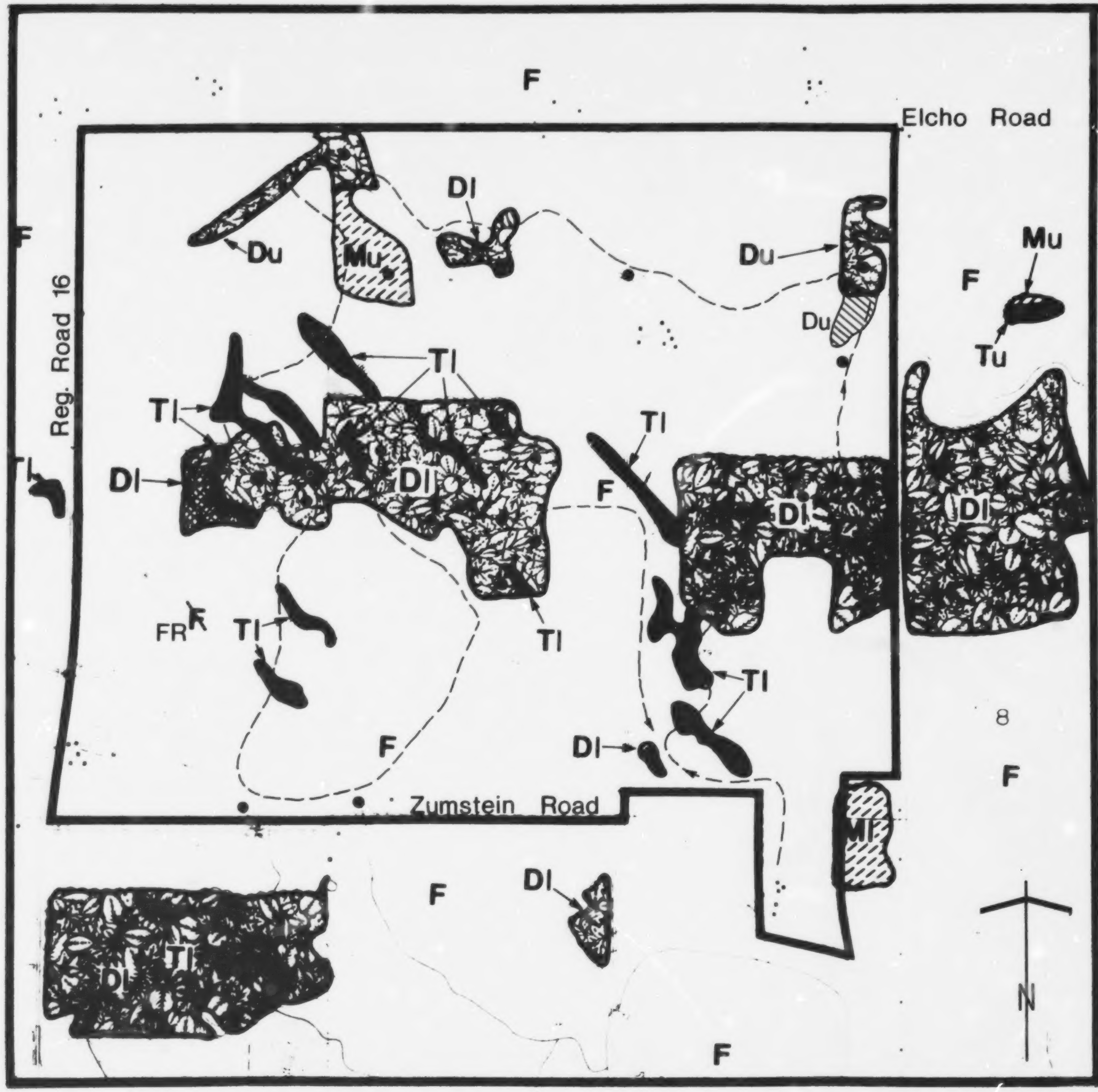
PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

County	Township	Lot—Con.	Location	Date	Collector	No.	Habitat and Notes

Herbarium / Reseacher / Date


F
Elcho Road
Reg. Road 16
Zumstein Road
Du
Mu
Dl
Tl
F
Tu
FR
Ml
8
N

3·6

Field Map 1
Vegetation Mapping
LF-3C-01

Legend

- ● Proposed Sample Points
- – – Proposed Fieldwork Transect

Changes In Mapping

- ▨ Add Habitat
- ▨ Delete Habitat
- FR Changed Designation

Vegetation Cover Types

- D Deciduous
- C Coniferous
- M Mixed
- F Field (cultivated or pasture)
- He Hedgerow (major)
- T Thicket

Cover Type Descriptors

- l Lowland
- u Upland

6.2 Significant Environmental Unit (SEU)

Scale 1:10,000

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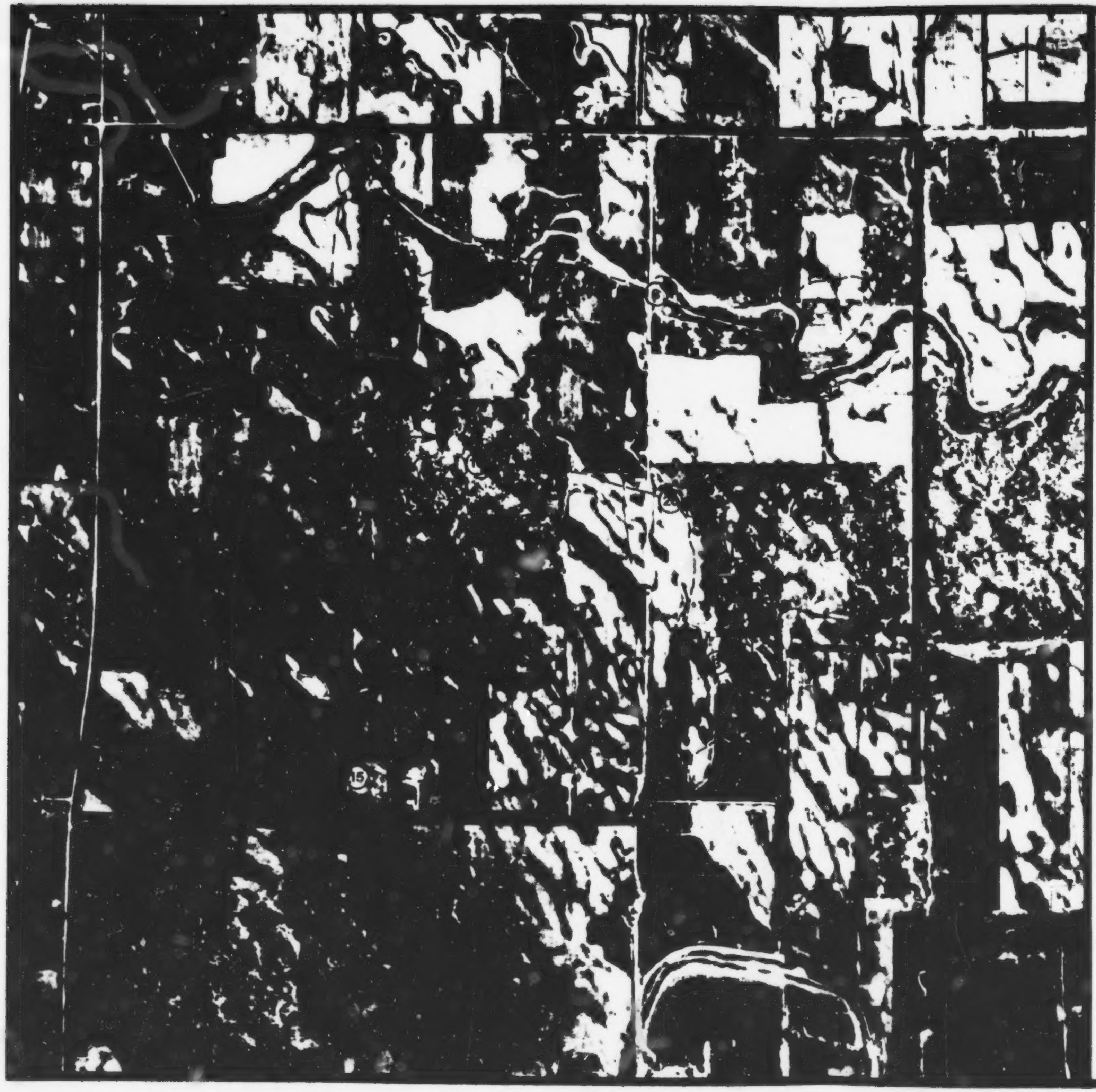

3·7

Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥	Field Observation Station (example)
P6 →	Photograph And Direction Taken
- -	Transect Followed In Field

MAP NOTES

Scale 1:10,000

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Lee
Associates
Limited

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SITE SELECTION PROCESS PHASE 4A:
TECHNICAL APPENDIX PI-1N -
EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee
Associates Limited

Gartner Lee Associates Limited

Consulting Engineering
Geologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ■ Markham, Ontario ■ L3P 3J9 ■ 416-477-8400
Telex-06-986278

September 16, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix PI-1N - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site PI-1N.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly

GARTNER LEE ASSOCIATES LIMITED

Grant Anderson

E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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BIOLOGICAL RESOURCES
STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr. - Associate and Senior Biologist of GLAL - Report Review

Kenneth Dance, M.Sc. - Associate and Senior Biologist of GLAL - Report Writing and Project Management

Thomas Hilditch, B.Sc.,Agr. - Biologist of GLAL - Data Collection

Donald Fraser, M.Sc. - Biologist of GLAL - Site Report Preparation

Wayne Weller, M.Sc. - Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site PI-1N and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Eight natural vegetation cover types occur on the site, including examples of both upland and lowland deciduous forest. No special vegetation associations or SEUs are present.

A total of 132 plant species is known from Site PI-1N, two of which are considered rare. Wildlife related data indicate the presence of 34 bird species, nine mammals, and one fish. None of these wildlife species is considered rare.

Forestry related activities include fuelwood extraction. Some mammal trapping takes place, however hunting is a minor activity. No fishing activity is reported.

A portion of one Significant Environmental Unit occurs within the PI-1N site vicinity. A pond on Indian Creek serves as a waterfowl staging area.

Eight rare plant species and two rare bird species have been recorded in the site vicinity.

1.0 INTRODUCTION

1.1 BACKGROUND

The Ontario Waste Management Corporation (OWMC) is involved in a five-phase process for the selection of a siting option for facilities to treat liquid industrial and hazardous wastes. This process has incorporated input from a number of areas of expertise including agriculture, biology, hydrogeology, socioeconomics and transportation.

At the end of the third phase of the site selection process, eight candidate sites within the Golden Horseshoe region of southern Ontario were identified (OWMC 1984). Biological factors developed to fulfill OWMC's goal of minimizing environmental impact were among several factors used in selecting the eight candidate sites. Gartner Lee Associates Limited completed the technical input for biology as reported in "Site Selection Process, Phase 3B: Selection of Candidate Sites - Biology" (GLAL 1984e). In that report, Site PI-1N was thought to possess minor biological constraints.

This report is a technical appendix to "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology" that documents and interprets field data and available biological information for Site PI-1N. It serves as a data base for comparing the eight candidate sites in the facility siting selection process.

1.2 SCOPE AND OBJECTIVES

As noted earlier, the previous Phase 3B evaluation of Site PI-1N was based primarily on existing data. For this Phase 4A assessment, the existing data base has been up-graded where possible and field work has been conducted on the site. The sampling and analytical elements of the program have been designed to meet study objectives and to provide an adequate basis for site comparisons.

Objectives of the Phase 4A biology study are:

- to describe existing biological conditions, on-site and in the site vicinity;
- to refine and confirm the Phase 3B data base through contact with pertinent agencies, experts and the public for both the site and site vicinity, and through field work on-site;
- to determine the level of constraint associated with biological resources;
- to assess the sensitivity and significance of biological resources; and
- to provide the Site Selection Team with biological assessments to use in refining site boundaries and in the siting option comparison.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The bulk of the existing biological information for Site PI-1N is summarized on two maps and in ten tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

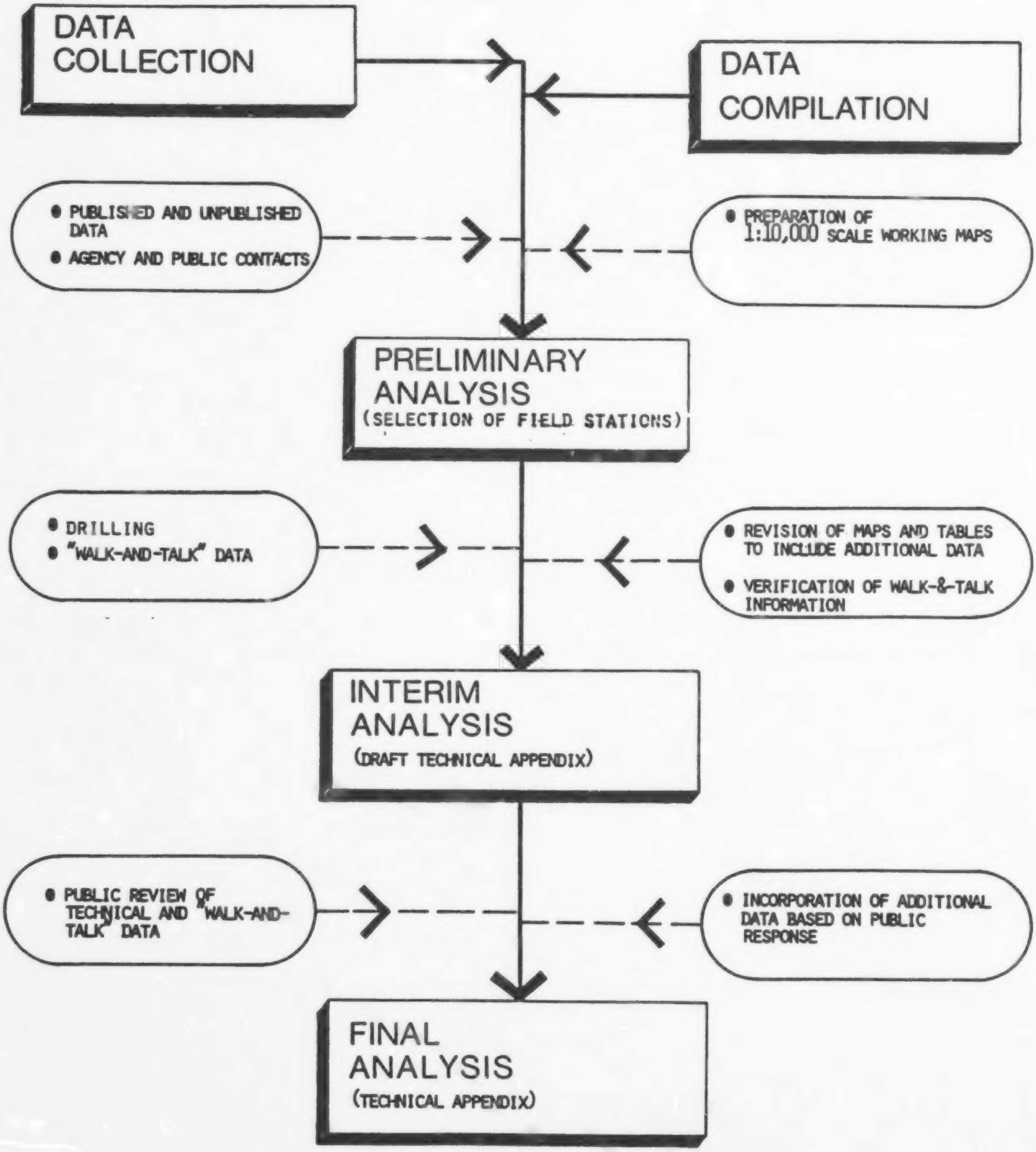
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
• PUBLISHED AND UNPUBLISHED DATA
• AGENCY AND PUBLIC CONTACTS
• PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS (SELECTION OF FIELD STATIONS)
• DRILLING
• "WALK-AND-TALK" DATA
• REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
• VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS (DRAFT TECHNICAL APPENDIX)
• PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
• INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS (TECHNICAL APPENDIX)

Government reports on vegetation and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Halton Region Conservation Authority, the Regional Municipality of Halton, and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site PI-1N are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984d), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

Where important features were known prior to field work, efforts were made to check these.

Reconnaissance field studies on Site PI-1N were conducted on November 14, 1984. Other visits to the site by GLAL biologists occurred on May 15 and 18, June 25 and November 6, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site PI-1N citizens group on August 1, 1984.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and "non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 9. These lists should be considered preliminary and may be incomplete.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the PI-1N site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Halton, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete

evidence such as a photograph and/or specimen, and the potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 9 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences which were discounted during the noteworthy species evaluation were not dealt with further. An example of such a species on Site PI-1N is Whooping Crane (*Grus americana*). This extremely rare species has not been observed in Ontario since the late 1890s (James *et al*. 1976). The sighting reported from Site PI-1N is undoubtedly erroneous. Reports of Wolves (*Canis lupus*) are considered to be incorrect also, and are probably the result of misidentifications of Coyotes (*C. latrans*).

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to faunal species which utilize Site PI-1N and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was also not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

A further public meeting to review the preliminary biological information was held on 7 May 1985. Additional data resulting from public responses were incorporated in the final report.

This technical appendix represents the interpretation of biological features and biological resource use at Site PI-1N to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

3.0 SETTING

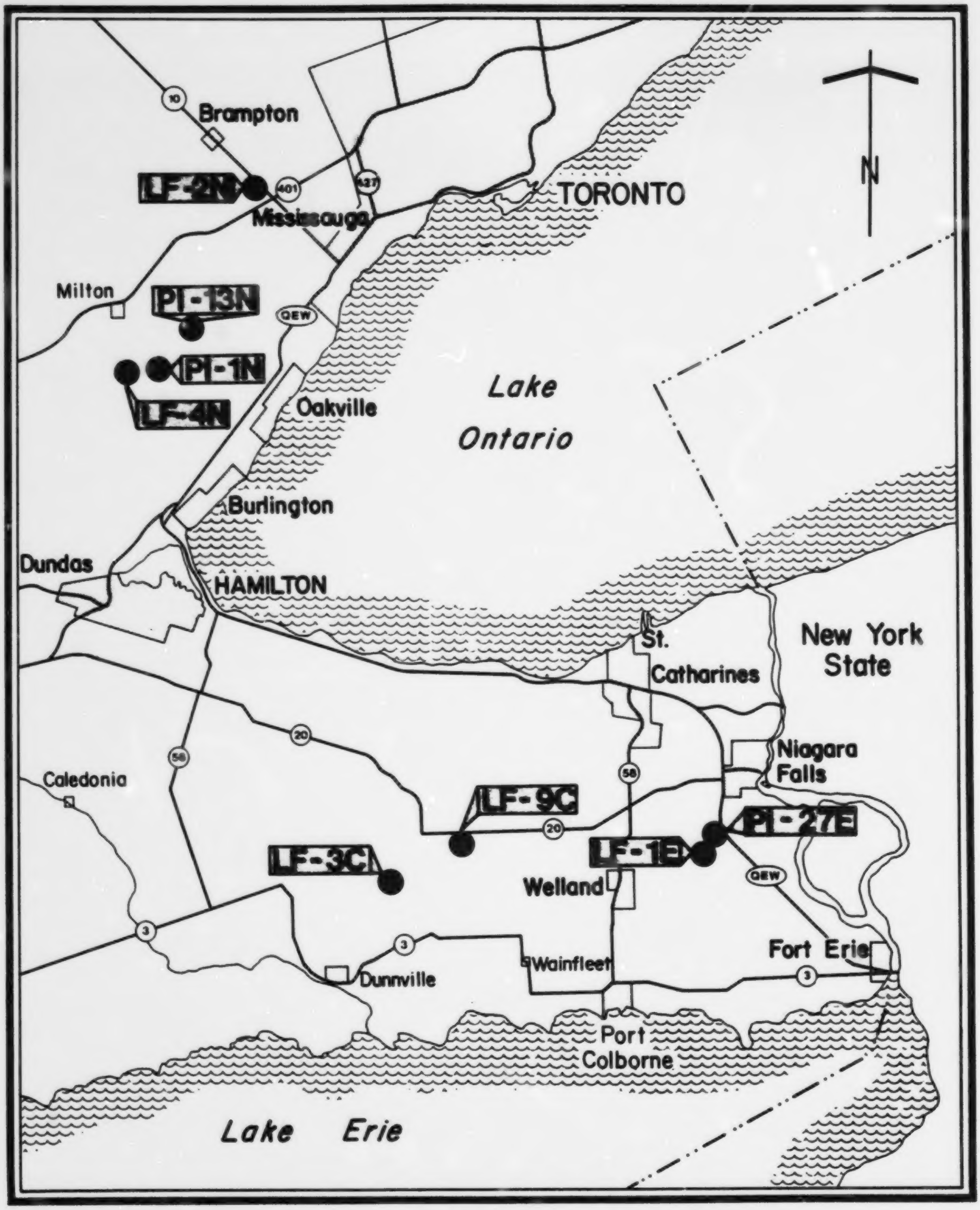
3.1 REGIONAL SETTING

Site PI-1N is located in the Regional Municipality of Halton. Its position relative to the other seven OWMC candidate sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within acquisition boundaries as portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It is 378 ha in size and includes Lots 3, 4 and 5, Concession II, Town of Milton and Lots 3, 4 and 5, Concession I, Town of Milton, formerly Township of Trafalgar. It is bounded on the northeast by Highway 25 (Bronte Road), on the northwest by Britannia Road and on the southwest by the Canadian National Railway Line.

The site is located within the corporate limits of the Town of Milton and is about 3.0 km southeast of the nearest built-up area. It is about 8.0 km south of Highway 401 and about 11 km north of the Queen Elizabeth Way. Road access is via Highway 25 or from the north.


Brampton
LF-2N
401
427
Mississauga
TORONTO
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Milton
PI-13N
QEW
PI-1N
LF-4N
Oakville
Lake
Ontario
Burlington
Dundas
HAMILTON
St.
Catharines
New York
State
20
56
58
Niagara
Falls
Caledonia
LF-9C
20
PI-27E
LF-1E
LF-3C
QEW
Welland
3
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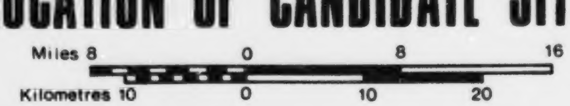
Wainfleet
Fort Erie
3
Dunnville
Port
Colborne
Lake Erie
10

FIGURE 2 LOCATION OF CANDIDATE SITES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16
Kilometres 10
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10
20

4.0 EXISTING
BIOLOGICAL RESOURCES - SITE

Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

4.1 OVERVIEW OF SITE BIOLOGY

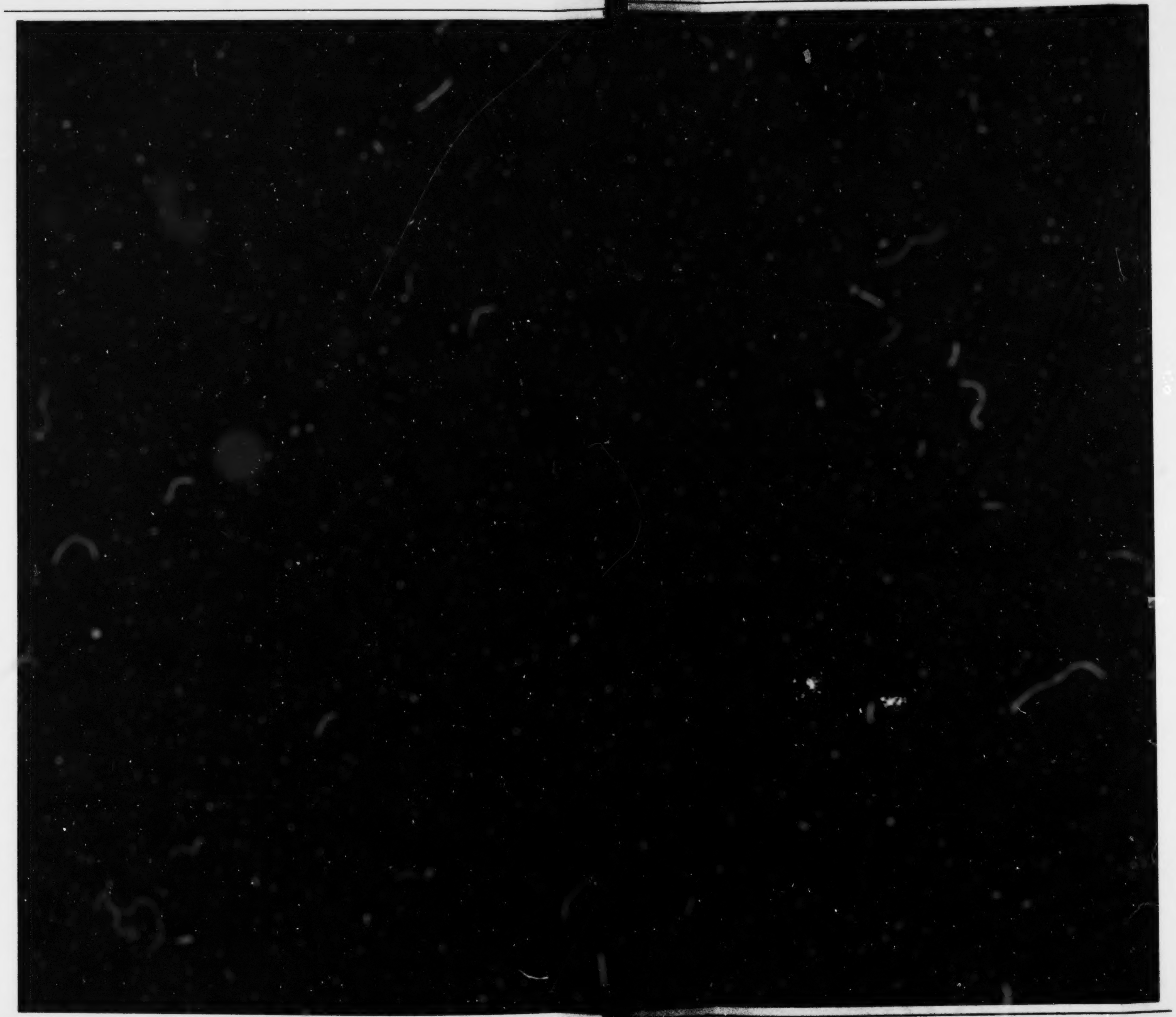
Five upland deciduous woodlots occur on the site (Figure 3) and collectively occupy approximately 6% of the site area. The dominant overstory species are noted in Section 4.2.2.

Areas of upland and lowland thicket, recently disturbed field, upland deciduous forest, upland coniferous forest, old field and marsh are also present. Approximately 83% of the site is currently in agricultural production.

Thirty-four bird species have been recorded within the acquisition area, 29 of which likely utilize the area for nesting purposes. Nine species of mammals, and one fish species have also been recorded from the site.

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated in Section 4.2.2.



OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

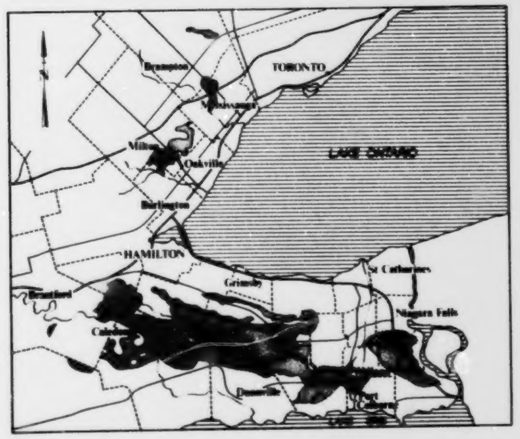
Rare Species Location

ANIMALS	PLANTS
	Ⓢⓡ Black Snakeroot

▭ Forestry Potential

━ Phase 3B Acquisition Boundary *
━ Proposed Acquisition Boundary * *

Key Map: PI - 1 North


N
Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
St Catharines
Grimsby
Brantford
Niagara Falls
Caledonia
Dunnville
Port Colborne

* Applied in this technical appendix.

** Derived during phase 4A, see "Site Selection Process Phase 4A: Selection of a Preferred Site - Biology"

Scale Bar	500	0	500
	250	0	250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 **Figure 3**

4.2.1 SPECIES LIST:

A total of 132 plant species has been recorded on Site PI-1N. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Eight natural vegetation associations are present on Site PI-1N. Cropland and unclassified land are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under four major cover type headings.

Forest

The dominant forest cover on the site is upland deciduous, occupying approximately 21 hectares. Other forest associations present include lowland deciduous and upland coniferous, each of which comprise less than one hectare.

Forest occurs in five main blocks on the site, four in the southern half.

The upland deciduous forest is dominated by White Oak (*Quercus alba*), Sugar Maple (*Acer saccharum*), Shagbark Hickory (*Carya ovata*), Red Oak (*Quercus rubra*) and White Pine (*Pinus strobus*).

The lowland deciduous component is dominated by Silver Maple (*Acer saccharinum*).

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE PI-1N

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Deciduous Forest	21
Lowland Deciduous Forest	<1
Upland Coniferous Forest	<1
Upland Shrub Thicket	<1
Lowland Shrub Thicket	<1
Recently Disturbed Field	7
Old Field	12
Marsh	2
Other	
Cropland	315
Unclassified	17
TOTAL	378

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting all other cover type areas from the total site area.

Upland coniferous woods on the site are represented by plantations. Two dense conifer lines are located near residences in the south half of the site.

Approximately one third of the woods on the site are young stands composed of pole-sized material. These woods occur in the northeast corner of the site and near the centre of the site east of First Line.

The woodlot in the south-central portion of the site is more mature. In places the woods are dominated by large, open grown White Oak trees greater than one metre diameter at breast height (dbh), with a moderate sapling understory.

Similarly structured mature oak woods also occur in two blocks in the southwest corner of the site. The largest has a White Pine component of approximately 20% canopy cover. The smaller of the two is an oak/hickory woods with a more open canopy and moderate sapling and shrub components.

Thicket

Lowland thicket occupies less than one hectare of the site. The thicket areas are scattered through the southwest portion of the site, associated with the woodlands present. The dominant shrub is Gray Dogwood (*Cornus racemosa*). One small upland thicket patch less than one hectare in size is associated with a minor water course in the northeast corner of the site.

Marsh

Two hectares of marsh are present on the site, in small pockets associated with streams and pond edges. The largest marsh association is located in the northeast corner of the site along the water course. Narrow-leaved Cattail (*Typha angustifolia*) is the dominant robust emergent present.

The dominant narrow-leaved emergents include Reed Canary Grass (*Phalaris arundinacea*) and Wool-grass (*Scirpus cyperinus*).

Field

Both old and recently disturbed fields are present on the site.

Old field, occupying approximately 12 hectares, is located in pockets throughout the site. It is generally associated with drainage swales and woodlot edges. The field is dominated by native herbaceous vegetation.

Recently disturbed field, occupying approximately 7 hectares of the site, occurs in four blocks. Three are associated with residences or aircraft runways. Its dominants include Wild Carrot (*Daucus carota*), and Orchard Grass (*Dactylis glomerata*).

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS:

Special associations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distribution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

No special vegetation associations or SEUs were recorded on this candidate site.

4.3 FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Thirty-four bird species, nine mammal species, and one fish species have been recorded on Site PI-1N. Master species lists are presented in Tables 6 through 9.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

Approximately 2 ha of marsh are present in 13 small patches scattered throughout the site. These marsh pockets probably support frogs, turtles and some marsh birds.

An intermittent, unnamed creek which drains into Indian Creek flows through the southern and western portions of the site. An intermittent, unnamed tributary of Sixteen Mile Creek (also known as Oakville Creek) drains the northern and eastern portions of Site PI-1N.

4.3.3 EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Eight natural vegetation cover types occur on Site PI-1N. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site PI-1N cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

More than 80% of Site PI-1N (315 ha) is currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer, (*Odocoileus virginianus*) and granivorous birds) as food sources but rarely support nesting birds. Recently disturbed fields (7 ha) may provide suitable breeding habitat for ground-nesting birds such as Upland Sandpipers (*Bartramia longicauda*) and Grasshopper Sparrows (*Ammodramus savannarum*). However, this vegetation cover type is most important as terrestrial wildlife habitat in later stages of plant succession. Old field habitat on Site PI-1N (12 ha), is a potential breeding area for both ground and shrub-nesting birds such as Eastern Kingbird (*Tyrannus tyrannus*), Gray Catbird (*Dumetella carolinensis*), Yellow Warbler (*Dendroica petechia*), Song Sparrow (*Melospiza melodia), and American Goldfinch (Carduelis tristis). Mammals associated with this habitat type include Woodchuck (Marmota monax) and Eastern Cottontail (Sylvilagus floridanus).

Forests

The interface between field and forest habitats is occupied by "edge" species. Although narrow, the "edge" ecotone typically provides the greatest diversity of vegetation types and thus supports a correspondingly high number of wildlife species (Taylor and Taylor 1979).

The breeding bird community associated with "edge" species on Site PI-1N is an overlapping one, comprised of both field and forest dwellers. Woodlot margins are also favoured by Coyotes, Red Fox (Vulpes vulpes) and deer. Cavities in trees provide den sites for Raccoons (Procyon lotor).

The structure and diversity of the breeding bird community associated with the deciduous forest types on Site PI-1N are strongly influenced by the vertical complexity of the vegetation. The two second-growth woodlots described in Section 4.2.2 have attained an intermediate stage of succession. One is characterized by stands of pole-sized Silver Maples with a moderate understory of saplings and shrubs, the other by a mixture of upland species.

The avian niches provided by second-growth woods are typically suited for occupation by insectivores and omnivores (Samson 1979). Most forage on the ground or at a low elevation. Canopy dwellers are probably absent from this immature forest type. Typical breeding birds which may be associated with the upland and lowland deciduous woods on Site PI-1N include Downy Woodpecker (Picoides pubescens), Northern Flicker (Colaptes auratus), American Crow (Corvus brachyrhynchos), Brown Thrasher (Toxostoma rufum), American Robin (Turdus migratorius), Ovenbird (Seiurus aurocapillus) and Yellow Warbler.

The avian niches provided by mature oak forests are primarily suited for occupation by insectivorous canopy dwellers such as Red-eyed Vireos (Vireo olivaceus). The absence of shrub cover throughout much of these mature wooded areas eliminates some ground feeders and understory foliage gleaners.

Thicket

Lowlying wet thickets provide potential nesting habitat for Willow Flycatchers (Empidonax traillii), Yellow Warblers, Common Yellowthroats (Geothlypis trichas) and Swamp Sparrows (Melospiza georgiana).

Marsh

Marsh habitat is dominated by an association of low grasses and sedges which may support nesting Bobolinks (Dolichonyx oryzivorus). Red-winged Blackbirds (Agelaius phoeniceus) may nest wherever robust emergents such as cattails occur. Muskrats (Ondatra zibethicus) also favour these wet areas.

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds. No special habitats are known to occur on Site PI-1N.

4.4 RARE SPECIES

4.4.1 INTRODUCTION:

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation. These are indicated in Tables 5 through 9 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed in Sections 2.2 and 7.1 of this technical appendix and in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

To make information presentation more logical, indicators of rare species are not used to divide the discussions are organized by life form (animals and plants) and species. Each indicator is addressed within each species discussion.

The approximate locations of rare species occurring on the site are mapped in Figure 3 at an original scale of 1:5,000. The scale of this map has been reduced for reporting purposes. Circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species where, for example, several inidviduals are found in close proximity to one another. Information concerning actual numbers of individuals of rare species and their on-site distribution is presented later in this section and in Table 2.

However, it should be emphasized that existing rare species data are based on preliminary investigations. Further on-site field work could result in an increase in both the numbers and individuals of rare species.

4.4.2 RARE ANIMAL SPECIES:

None of the animal taxa known to occur on Site PI-1N is considered rare.

4.4.3 RARE PLANT SPECIES:

Two plant species, Black Snakeroot (*Sanicula gregaria*) and a Sedge (*Carex scoparia*) were reported from Site PI-1N (Bird and Hale Limited 1985). Both are considered to be regionally rare (Crins, *pers*. *comm*. 1985).

Black Snakeroot

This species, characteristic of rich woods, was reported from the small woodlot situated adjacent to First Line at approximately the centre of the site (Figure 3).

Sedge

The location of this species is uncertain. It has been recorded from a vegetation unit in the southeast corner of the site (Bird and Hale Limited 1985). Part of the vegetation unit extends into the site vicinity. For these reasons the species is listed for both the site and site vicinity in Table 5. For reporting purposes, we consider the species as a site occurrence.

This species grows in a variety of habitats, ranging from dry to wet conditions.

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered are: forestry, trapping, hunting and fishing. Resource use has been identified as a biological factor, the rationale for which is provided in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.5.1 FORESTRY:

Forestry potential (Figure 3) refers to wooded areas which could be commercially logged for sawlogs, veneer logs and fuelwood.

On-site assessments of forestry potential were made by GLAL on the basis of the following criteria: size of woodlot, species composition, age and size of trees, accessibility and aspect.

Additional information pertaining to the forestry potential of Site PI-1N was provided in Forest Resource Inventory maps (OMNR 1979) and questionnaire results.

The woods in the eastern portion of the site are fragmented by marsh and old field. Totalling approximately 3 hectares in area, they are dominated by over mature White Oak trees and a dense, repressed sapling layer. Potential exists for some sawlog and veneer log production, as well as fuelwood thinning where the character of the woods is less mature.

The largest (7 hectares) woodlot on the site, situated in the southern corner, has the highest forestry potential

(Figure 3). It is a large, continuous block of woods, bisected by a small creek.

The more mature character of the woods suggests that sawlog and veneer log production are currently feasible, as are some fuelwood thinning operations.

Cutting fuelwood for personal consumption (Pompa, *pers. comm.* 1984; Curtis, *pers. comm.* 1984; Gowland, *pers. comm.* 1984; Chlon, *pers. comm.* 1984; Marangoni, *pers. comm.* 1984) is a minor forestry activity on Site PI-1N.

Within a regional context, forestry is not a significant resource use of Site PI-1N.

4.5.2 TRAPPING:

Site PI-1N lies within the trapping area worked by one licensed trapper. This individual traps in upland areas on either side of Britannia Road in the southeastern portion of the site (Mackie, *pers. comm.* 1984). In 1983-84, Red Fox, Coyote, Raccoon and Muskrat were harvested along the Britannia Road corridor. Specific numbers of animals taken from the site itself are not known.

Mackie (*pers. comm.* 1984) contends that trapping yields from this site have declined in recent years and suggests that rabies may be a contributing factor.

4.5.3 HUNTING:

"Jackrabbit" (European Hare, *Lepus europaeus*) hunting has been reported on Site PI-1N (Curtis, *pers. comm.* 1984). In general, however, hunting activity is not an important biological resource use on the site.

4.5.4 FISHING:

No fishing activity has been reported for Site PI-1N. The only fish species known to occur is Carp (*Cyprinus carpio*). Fishing is not an important biological resource use on the site.

4.6 SUMMARY-SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to present the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 2 Summary Site Biological Resources PI-1N

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURCE USE			
SPECIES	NO. OF INDIVIDUALS	DISTRIBUTION	SPECIES LIST	AQUATIC HABITAT	TERR. WILDL. HABITAT	SPECIAL HABITATS	SPECIES LIST	AREA NAT. VEGETATION	NO. OF COVER TYPES	SPECIAL ASSOC./SEU	FORESTRY	TRAPPING	HUNTING	FISHING
Black Snake-root	unknown, this species reported but not confirmed by GLAL	small woodlot on east side of First Line	• 34 birds • 9 mammals • 1 fish	• unnamed tributary of Indian Creek • unnamed tributary of Six-teen Mile Creek	• 8 natural vegetation cover types • less than 25 ha of forest • some thicket, recently disturbed field, old field and marsh habitat • habitat for forest, edge, and old field communities	none reported	132 Plant Species	• Upland Deciduous Forest 21 ha • Lowland Deciduous Forest <1 ha • Upland Coniferous Forest <1 ha • Upland Thicket <1 ha • Lowland Thicket <1 ha • Recently Disturbed Field 7 ha • OldField 12 ha • Marsh 2 ha	• 8 natural vegetation cover types - see list to left	none reported	• some fuel wood extraction • Upland Deciduous woods capable of some sawlog production • several very large White Oak trees in woods on south edge of site	• Muskrat, Raccoon trapping • one licensed trapper	• some hunting of rabbits • of very minor significance	none reported
Carex Scoparia	"	in wooded complex in the southeast corner of the site												

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

5.1 INTRODUCTION

Site vicinity is defined as the area which lies outside Site PI-1N within approximately a 2.0 km radius of the acquisition boundary. The PI-1N site vicinity boundary is delineated in Figure 4 and referred to as "Site Vicinity Study Area Boundary".

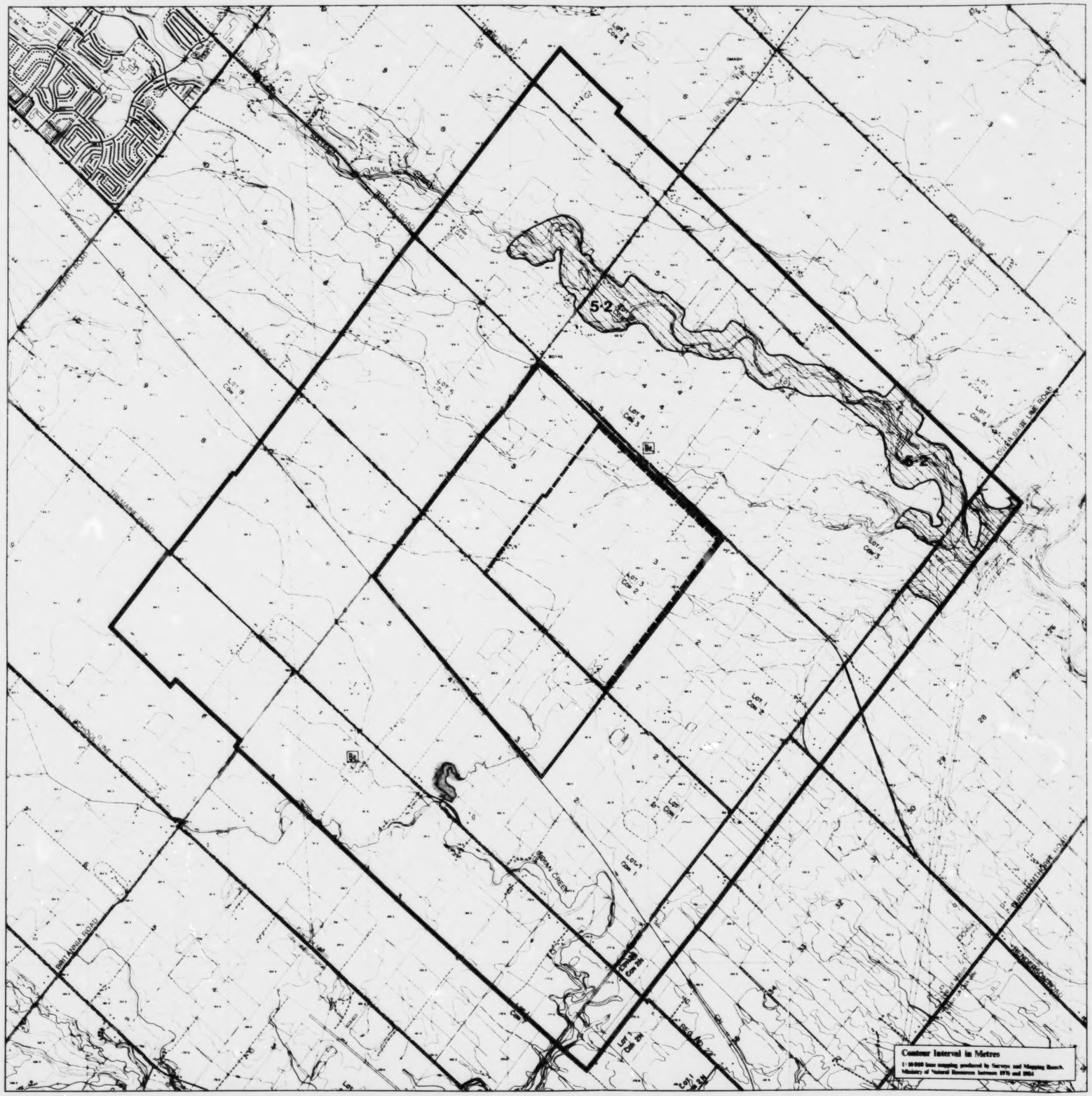
A total of 193 plant species has been recorded in the site vicinity (Table 5). Sixty-nine of the 76 bird species reported from the site vicinity are permanent or summer residents which possibly breed in the area (Ontario Breeding Bird Atlas 1984; Table 6). An additional 13 species of mammals, one species of reptile, and 19 species of fish are known to occur in the site vicinity (Tables 7 through 9 respectively).

In general, the pattern of vegetation cover types found throughout the site vicinity is more extensive but similar to that which exists on the site itself.

Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations, and rare species.

OWMC Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited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SIXTEEN MILE CREEK

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Legend:

Rare Species Location

ANIMALS

Be Eastern Bluebird

PLANTS

Significant Environmental Units

▨ ESAs, ANSIs and AIBRs

13·3 Unit number
Candidate area number

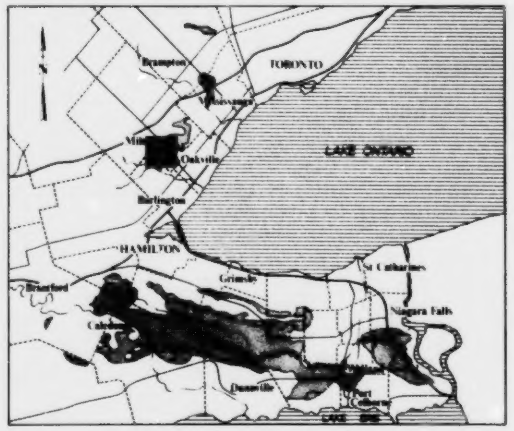
Significant Fish and Wildlife Features

☐ Waterfowl Staging Area

Proposed Acquisition Boundary
Phase 3B Acquisition Boundary
Site Vicinity Study Area Boundary

Key Map: **PI-1 North**

Lots 3, 4 and 5; Concession 11; Town of Milton; Parts of Lots 3, 4 and 5; Concession 1; Town of Milton, formerly in the Township of Trafalgar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St Catharines
Grimsby
Niagara Falls
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Caledonia
Dunnville
Port Colborne
LAKE ERIE

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EXISTING BIOLOGICAL CONDITIONS, PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

September 1985 **FIGURE 4**

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definitions of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

SEUs

A portion of one SEU occurs within the PI-1N site vicinity (Figure 4). Areas of the three natural vegetation cover types represented in SEUs are noted in Table 3.

The Sixteen Mile Creek Valley (SEU 5-2) is recognized as an ANSI (OMNR 1983b), as an AIBR (OMNR 1983a) and as an ESA (Regional Municipality of Halton 1978a). This wide, deeply incised river valley occupies the northeastern section of the PI-1N site vicinity. At its closest point, this SEU is situated 450 m from the site itself. The Sixteen Mile Creek Valley satisfies five of the ESA criteria established by Halton R.M. The valley serves as a major ground water discharge area and important migratory corridor for fish and wildlife, supports high quality deciduous and mixed forests, contains a high diversity of plant and animal species, supports rare plant species, and is large in areal extent.

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

Waterfowl Staging Areas

According to a site vicinity resident (DaSilva, pers. comm. 1984), "thousands" of Canada Geese (Branta canadensis) and ducks congregate on a pond along Indian Creek (Figure 4). Although not explicitly stated, this large number of geese presumably refers to staging during fall migration.

The significance of this waterfowl staging area in a regional context cannot be determined at this time. No portion of Indian Creek is identified as a waterfowl staging area by the OMNR (undated a).

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within the site vicinity which is not designated as SEU. Five natural vegetation associations are represented. The approximate area of each vegetation association is indicated in Table 3. Some appear to have similar structure and composition to those areas studied on Site PI-1N.

Forest

A mosaic of deciduous, coniferous and mixed forest is present in the site vicinity. The deciduous woods represent the largest component of natural vegetation, covering approximately 85 hectares.

The bulk of the forested lands in the vicinity are associated with Sixteen Mile Creek, situated to the northeast of the site boundary. The vegetation in the valley forms an almost uninterrupted wooded corridor through the vicinity.

TABLE 3: AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, PI-1N

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
SEU	
Deciduous Forest	88
Coniferous Forest	6
Successional Field	<1
Other	
Deciduous Forest	47
Mixed Forest	5
Coniferous Forest	<1
Successional Field	22
Wetland	5
TOTAL	175

* Areas are approximate and are rounded to whole numbers.

External to the Sixteen Mile Creek Valley are thinly scattered, small wooded areas.

Three small conifer woodlots (totalling less than one hectare) and seven small patches of mixed woods (totalling 5 hectares) are present in the vicinity.

Wetland

Wetlands in the site vicinity total approximately 5 hectares. Two small wetland pockets are located along a tributary of the Sixteen Mile Creek and another is found in a small depression in the northwest corner of the site vicinity.

Successional Field

Blocks of successional field totalling 22 hectares are scattered throughout the vicinity. These fields are adjacent to or near the Sixteen Mile Creek Valley.

Since no field work was conducted in the site vicinity, the significance of site vicinity natural vegetation units as wildlife habitat can only be speculated upon. Most of the woodlots found in the site vicinity are substantially larger in area than those found on the site itself and may harbour a greater diversity of wildlife. The contiguous forested areas associated with Sixteen Mile Creek collectively function as a travel corridor for fish and wildlife.

5.5 RARE SPECIES

Where known, the approximate locations of rare species occurring in the site vicinity are mapped in Figure 4 at an original scale of 1:10,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. For information concerning actual numbers of individuals of rare species and their site vicinity distribution, the reader is referred to the accompanying text of Section 5.5.

5.5.1 RARE ANIMAL SPECIES:

Two rare bird species have been reported in the PI-1N site vicinity.

Red-shouldered Hawk (*Buteo lineatus*)

Since the early 1960's, the Red-shouldered Hawk population in the Central Region of Ontario (including Halton R.M.) has experienced "a drastic decline" (Risley 1982). According to preliminary results of the Ontario Breeding Bird Atlas Project (Ontario Breeding Bird Atlas 1984), this species is listed as a "possible" breeder in the 10 km square unit (square 17-NV-91) which encompasses the PI-1N site vicinity. The specific location of this sighting within square 17-NV-91 is not known and may fall outside the site vicinity boundary.

In the event that nesting by Red-shouldered Hawks is confirmed in the vicinity of Site PI-1N, this species should be considered rare on a regional level. For nesting purposes, Red-shouldered Hawks prefer large tracts of moist riparian woodland (Risley 1982), a habitat type which is represented by the Sixteen Mile Creek Valley ESA.

Eastern Bluebird (*Sialia sialis*)
Bluebirds have been reported from two locations in the PI-1N site vicinity (Gillies, *pers. comm.* 1984; Snow, *pers. comm.* 1984; Figure 4). These observations may involve migrant individuals, however, as evidence of breeding is presently lacking.

Throughout much of its range, the Eastern Bluebird has experienced a pronounced population decline in recent years (Tate and Tate 1982). The species was recently added to the list of rare Canadian taxa by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Muir 1984).

As of 1983, no breeding evidence for the Eastern Bluebird was recorded in any of the 10 km square units containing or adjacent to Site PI-1N (Ontario Breeding Bird Atlas 1984). If future breeding is confirmed on Site PI-1N, this species should be considered regionally rare.

5.5.2 RARE PLANT SPECIES:

Eight plant species reported from the PI-1N site vicinity are rare based upon recognized sources.

Two are considered rare in Ontario and Canada (Argus and White 1977). These are:

Twin-leaf	Jeffersonia diphylla
Virginia Cowslip	Mertensia virginica

Twin-leaf is also considered to be rare in the Regional Municipality of Halton (Crins, pers. comm. 1984a).

The remaining six are considered to be rare in Halton Region (Crins, pers. comm. 1984a, 1984b). These are:

Chinquapin Oak	Quercus muhlenbergii
Black Oak	Q. velutina
New York Fern	Thelypteris novaboracensis
Baltic Rush	Juncus balticus
Butterfly-weed	Asclepias tuberosa
Meadow Horsetail	Equisetum pratense

Black Oak

This species has been reported from the site vicinity (Vertulia, pers. comm. 1984). Exact locations are unknown, however it is probably associated with the Sixteen Mile Creek Valley ESA. The occurrence of Black Oak is doubtful, as records for Halton Region are associated with areas much closer to Lake Ontario (Crins, pers. comm. 1984b).

New York Fern, Meadow Horsetail, Baltic Rush, Butterfly-weed

The exact locations of these rare species are unknown and their occurrence in the vicinity is doubtful. They have been reported from the Sixteen Mile Creek Valley ESA from "Highway # 5 north to one mile above Henderson Park"

(McLaren 1978). The northernmost mile of the area McLaren described falls within the vicinity of Site PI-1N. The remainder, however, is outside the vicinity.

Chinquapin Oak, Twin-leaf, Virginia Cowslip

There is some question as to whether these three species occur in the site vicinity.

Chinquapin Oak is reported from the Sixteen Mile Creek Valley ESA (Regional Municipality of Halton 1978a), although no specific location is given. The nearest known station is south of Highway 5 on Sixteen Mile Creek, approximately 5 kilometres south of the vicinity (Regional Municipality of Halton 1980c).

Twin-leaf is also reported from the ESA, part of which enters the PI-1N vicinity (Regional Municipality of Halton 1978a). McLaren (1978) also lists it from a portion of Sixteen Mile Creek. It is doubtful that these records occur in the vicinity. The nearest known station is north of Burnamthorpe Road along Sixteen Mile Creek, and lies approximately one kilometre south of the vicinity.

Virginia Cowslip was reported by McLaren (1978) and by the Regional Municipality of Halton (1978a) from somewhere within the Sixteen Mile Creek Valley ESA. The exact locations are unknown and it is questionable whether the species occurs in the vicinity.

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information, as summarized in Table 4, provides background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources PI-1N

FACTORS AND INDICATORS

SIGNIFICANT ENVIRONMENTAL UNITS			FISH AND WILDLIFE FEATURES OF SIGNIFICANCE		OTHER NATURAL VEGETATION	RARE SPECIES
	SEU	DISTANCE TO SITE	FEATURE	DISTANCE TO SITE		
EXISTING SITE VICINITY CONDITIONS	• 5-2 • Sixteen Mile Creek Valley • Halton R.M. ESA Study	450 m	• Waterfowl Staging Area - pond on Indian Creek	375 m	• Deciduous Forest 55 ha • Coniferous Forest <1 ha • Mixed Forest 5 ha • Successional Field 22 ha • Wetland 5 ha	Animals • Red-shouldered Hawk • Eastern Bluebird Plants • Twinleaf • Chinquapin Oak • Virginia Cowslip • Meadow Horsetail • New York Fern • Baltic Rush • Butterfly-weed • Black Oak

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7.0 SPECIES LIST

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 9) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins *et al*. 1982) and fish (Scott and Crossman 1973).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 9. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined; these are sources 19, 22 and 38.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", "Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

A regional perspective was obtained from several sources.

An Environmentally Sensitive Areas (ESA) study for Halton Region conducted in 1978 (Regional Municipality of Halton 1978a), addresses the rare plant species in the region. Subsequent works by the Regional Municipality of Halton (1979, 1980c), produced in conjunction with the Royal Botanical Gardens, provide updated species lists for designated ESAs in Halton Region and some discussion of rarity.

The Halton Region Conservation Authority (1979) produced a report entitled A Biological Inventory of Halton Region Conservation Authority Properties which contains a discussion of rare flora.

Sutherland (1981) has compiled A Provisional List of the Rare Vascular Plants of the Regional Municipality of Halton. This document was referred to for background information on plant status and distribution.

The most current source of information concerning plant status and distribution in Halton Region is a working file maintained by W.J. Crins at the Erindale Herbarium (University of Toronto). The file contains data concerning all plant collections made in the region to date. It is thought to accurately represent the regional status of plants (Crins, pers. comm. 1984a). Rare species are those for which there are five stations or fewer in Halton Region.

Material referred to for status information outside, but adjacent to, the Regional Municipality of Halton included The Vascular Plant Flora of Peel County (Webber 1984) and the ESA study prepared for the Regional Municipality of Hamilton-Wentworth (Ecologistics Ltd. 1976).

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reorts where applicable.

Frequency and realtive abundance standards are assigned to Ontario birds by James et al. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for a comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

The only published account of the birds of Halton Region is provided by Brooks (1906). This cursory treatment is now badly outdated. Subsequent investigations have apparently not been carried out on a regional level.

In the absence of any recent published data, the statuses which have been applied to various birds in Halton R.M. largely reflect the opinions of local experts and are thus purely subjective. References to "Significant" Halton species are contained in several recent reports (Regional Municipality of Halton 1978a; Halton Region Conservation Authority 1979).

More recent information on the status of breeding birds in Halton Region was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April 1984, 20 species of mammals are designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not addressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammalian fauna of the Regional Municipality of Halton. Information supplied by local naturalists and recognized authorities in the field of mammalogy was largely relied upon to determine the regional status of particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and

South Wellington Counties was also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from what was formerly Halton County; however, they do not assign status. A survey of the amphibians and reptiles of the Niagara Escarpment Planning Area (Campbell 1976) also includes references to Halton. The significance of several Halton herptiles is briefly addressed by the Halton Region Conservation Authority (1979).

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister *et al*. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species is presently protected in Ontario by "Endangered" species legislation. The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disproportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitive definitions of rarity could be proposed with a considerable degree of confidence. However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists. For many of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present

status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of Guelph, and the National Museum of Natural Sciences in Ottawa, were consulted on a number of occasions.

In cases where wildlife data were lacking, lengthy discussions were held with appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE PI-1N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
EQUISETACEAE	HORSETAIL FAMILY		
Equisetum arvense L.	Field Horsetail		21
E. pratense Ehrh. *	Meadow Horsetail		21
DENNSTAEDTIACEAE	BRACKEN FAMILY		
Pteridium aquilinum (L.) Kuhn	Bracken Fern		21
ASPLENIACEAE	SPLEENWORT FAMILY		
Matteuccia struthiopteris (L.) Todaro	Ostrich Fern		21
Athyrium felix - femina L.	Lady Fern	46	46
Cystopteris bulbifera L. Bernh.	Bulblet Fern		21
C. fragilis L. Bernh.	Fragile Fern		21
Dryopteris novaboracensis L. *	New York Fern		21
D. spinulosa (Muell.) Kuntze	Spinulose Shield-fern	46	21
Polystichum acrostichoides (Michx.) Schott	Christmas Fern	46	21
POLYPODIACEAE	POLYPODY FAMILY		
Polypodium vulgare L.	Common Polypody		21

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
PINACEAE	PINE FAMILY		
Pinus strobus L.	White Pine	46,22, 17	17,18, 46
Tsuga canadensis (L.) Carr.	Eastern Hemlock		17,8,18
CUPRESSACEAE	CYPRESS FAMILY		
Thuja occidentalis L.	Eastern White Cedar		8
TYPHACEAE	CATTAIL FAMILY		
Typha angustifolia L.	Narrow-leaved Cattail	22	19
POACEAE	GRASS FAMILY		
Bromus commutatus Schrad.	Smooth Brome Grass	46	46
Glyceria septentrionalis A.S. Hitchc.	Eastern Manna Grass	46	
G. striata (Lam.) A.S. Hitchc.	Fowl Manna Grass	46	46
Dactylis glomerata L.	Orchard Grass	22,46	46
Phragmites australis (Cav.) Trin. ex Steudel	Common Reed		19
Elymus hystrix L.	Bottle-brush Grass	22,46	
E. virginicus L.	Virginia Wild Rye	46	
Dathonia spicata (L.) Beauv.	Poverty Oat Grass	46	
Agrostis stolonifera L.	Creeping Bent Grass	46	
Alopecurus pratensis L.	Meadow Foxtail	46	46
Phleum pratense L.	Timothy	46	19,46
Oryzopsis asperifolia Michx.	Rough-leaved Mountain Rice		21
Phalaris arundinacea L.	Reed Canary Grass	22	
Leersia oryzoides (L.) Sw.	Rice Cut Grass	46	46
L. virginica Willd.	White Grass	46	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CYPERACEAE	SEDGE FAMILY		
Scirpus atrovirens Willd.	Black Bulrush		21
S. cyperinus (L.) Kunth.	Wool-grass	22	
S. validus Vahl.	Common Great Bulrush		21
Eleocharis acicularis (L.)	Spike-rush	46	46
E. obtusa (Willd.) Schult.	Blunt Spike-rush	46	21,46
Carex albursina Sheldon	Sedge	46	46
C. alopecoidea Tuckerm.	Sedge	46	46
C. arctata Boott.	Sedge	46	46
C. blanda Dewey.	Sedge	46	46
C. cephaloidea Dewey.	Sedge	46	
C. crinita Lam.	Sedge	46	46
C. cristatella Britt.	Sedge	46	46
C. deweyana Schwein.	Sedge	46	46
C. gracillima Schwein.	Sedge	46	46
C. hirtifolia Mackenzie	Sedge	46	46
C. intumescens Rudge.	Sedge	46	
C. laxiculmis Schwein.	Sedge	46	
C. lupulina Muhl. ex Willd.	Sedge	46	46
C. pensylvanica Lam.	Sedge	22	21
C. plantaginea Lam.	Sedge	22	21
C. rosea Schk.	Sedge	46	46
C. retrorsa Schwein.	Sedge	46	46
C. scoparia Muhl. ex Willd. *	Sedge	46	46
C. sparganoides Muhl.	Sedge	46	46
C. spicata Huds.	Sedge	46	
C. tenera Dewey.	Sedge	46	46
C. tribuloides Wahl.	Sedge	46	46
C. vulpinoidea Michx.	Sedge	46	46
C. woodii Dew.	Sedge	46	46
ARACEAE	ARUM FAMILY		
Arisaema triphyllum (L.) Torr.	Jack-in-the-pulpit	46	21,46

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LEMNACEAE	DUCKWEED FAMILY		
Lemna minor L.	Common Duckweed	46	46
JUNCACEAE	RUSH FAMILY		
Juncus balticus Willd.*	Baltic Rush		21
J. effusus L.	Soft Rush	46	46
J. tennuis Willd.	Path Rush	46	46
Luzula acuminata Raf.	Hairy Wood Rush	46	21,46
LILIACEAE	LILY FAMILY		
Allium canadense L.	Meadow Garlic		21
A. tricoccum Ait.	Wild Leek	22	21
Lilium canadense var. *michiganense* Farw.	Michigan Lily	46	21
Erythronium albidum Nutt.	White Trout Lily		8,21
E. americanum Ker.	Yellow Trout Lily		21
Smilacena racemosa (L.) Desf.	False Solomon's-seal	22,46	21,46
S. stellata Desf.	Star-flowered Solomon's-seal		21
Streptopus roseus Michx.	Twisted Stalk		21
Polygonatum pubescens (Willd.) Pursh.	Solomon's-seal		21
Trillium erectum L.	Red Trillium		21
T. grandiflorum (Michx.) Salisb.	Large-flowered Trillium	46	21
Smilax herbacea L.	Carrionflower	22,46	21

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
SALICACEAE	WILLOW FAMILY		
Populus tremuloides Michx.	Trembling Aspen	46	
Salix alba L.	White Willow	46	
S. amygdaloides Anderss.	Peach-leaved Willow	46	
S. discolor Muhl.	Pussy Willow	46	46
S. exigua Nutt.	Sandbar Willow		21
S. fragilis L.	Crack Willow	46	
JUGLANDACEAE	WALNUT FAMILY		
Juglans nigra L.	Black Walnut		13
Carya cordiformis (Wang.) K. Koch	Bitternut Hickory		8
C. ovata (Mill.) K. Koch	Shagbark Hickory	20,22, 46	46
BETULACEAE	BIRCH FAMILY		
Carpinus caroliniana Walt.	Blue Beech	22,46	46
Ostrya virginiana (Mill.) K. Koch	Hop Hornbeam	22,17, 46	46
Betula papyrifera Marsh.	Paper Birch	22,17	
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech	22,46	17,18,21, 46
Quercus alba L.	White Oak	22,20, 17,46	17,18,46
Q. macrocarpa Michx.	Bur Oak	20,46	46
Q. muhlenbergii Englem.*	Chinquapin Oak		8
Q. rubra L.	Red Oak	22,17, 46	17,18,46
Q. velutina Lam. *	Black Oak		13

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	20	
URTICACEAE	NETTLE FAMILY		
Urtica dioica L.	Stinging Nettle		21
Boehmeria cylindrica (L.) Schwein.	False Nettle		21
SANTALACEAE	SANDALWOOD FAMILY		
Comandra umbellata (L.) Nutt.	Bastard Toadflax		21
ARISTOLOCHIACEAE	BIRTHWORT FAMILY		
Asarum canadense L.	Wild Ginger		21
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex crispus L.	Curled Dock	46	46
Tovara virginiana (L.) Raf.	Virginia Knotweed	46	
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium album L.	Lamb's-quarters	46	46
PORTULACACEAE	PURSLANE FAMILY		
Claytonia virginica L.	Spring Beauty		21
CARYOPHYLLACEAE	PINK FAMILY		
Stellaria graminea L.	Grass-leaved Stitchwort	46	46

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
RANUNCULACEAE	BUTTERCUP FAMILY		
Actaea pachypoda Ell.	White Baneberry		21
Anemone canadensis L.	Canada Anemone		21
A. quinquefolia L.	Wood Anemone		21
Anemonella thalictroides Spach	Rue-anemone		21
Hepatica americana (DC.) Ker.	Blunt-leaved Hepatica		21
Clematis virginiana L.	Virgin's Bower		21
Ranunculus abortivus L.	Kidney-leaved Buttercup		21
R. septentrionalis Poir.	Bristly Buttercup		21
Thalictrum dioicum L.	Early Meadow Rue		21
T. polygamum Muhl.	Tall Meadow Rue		21
BERBERIDACEAE	BARBERRY FAMILY		
Podophyllum peltatum L.	May-apple		21
Jeffersonia diphylla L. *	Twin-leaf		8,21
Caulophyllum thalictroides (L.) Michx.	Blue Cohosh		21
MENISPERMACEAE	MOONSEED FAMILY		
Menispermum canadense L.	Moonseed Vine		8
LAURACEAE	LAUREL FAMILY		
Sassafras albidum (Nutt.) Nees	Sassafras		8,21
PAPAVERACEAE	POPPY FAMILY		
Chelidonium majus L.	Celandine		21
FUMARIACEAE	FUMITORY FAMILY		
Dicentra cucullata Torr.	Dutchman's Breeches		21

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
BRASSICACEAE	MUSTARD FAMILY		
Alliaria officinalis Andrz.	Garlic Mustard		21
Barbarea vulgaris R.Br.	Yellow Rocket	46	21,46
Dentaria diphylla Michx.	Toothwort		21
D. laciniata Muhl.	Cut-leaved Toothwort		21
Hesperis matronalis L.	Dame's Rocket		21
GROSSULARIACEAE	GOOSEBERRY FAMILY		
Ribes cynosbati L.	Pasture Gooseberry		21
SAXIFRAGACEAE	SAXIFRAGE FAMILY		
Saxifraga virginiensis Michx.	Early Saxifrage		21
ROSACEAE	ROSE FAMILY		
Spirea alba Du Roi	Narrow-leaved Meadowsweet	46	
Amelanchier sanguinea (Pursh) DC.	Serviceberry		21
A. stolonifera Wieg.	Serviceberry		21
Crataegus coccinea L.	Hawthorn	46	46
C. corusca Sarg.	Hawthorn	46	
C. punctata Jacq.	Hawthorn	46	46
Rubus idaeus L. var. *strigosus* (Michx.) Maxim.	Wild Red Raspberry	22,46	21,46
R. occidentalis L.	Black Raspberry	46	46
R. odoratus L.	Purple-flowering Raspberry		21
Fragaria vesca L.	Wood Strawberry	22	
F. virginiana Dene.	Strawberry	22	19
Potentilla anserina L.	Silver-weed		21
Waldsteinia fragaroides (Michx.) Tratt.	Barren Strawberry		21

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
Geum allepicum Jacq. var. *strictum* (Ait.) Fern.	Yellow Avens		21
Rosa blanda Ait.	Smooth Rose		21
R. carolina L.	Pasture Rose		21
FABACEAE	PEA FAMILY		
Medicago lupulina L.	Black Medic	46	
Melilotus alba Desr.	White Sweet-clover	46	46
Lotus corniculatus L.	Bird's-foot Trefoil	46	
Desmodium glutinosum (Muhl.) Wood	Sticky Tick Trefoil		21
GERANIACEAE	GERANIUM FAMILY		
Geranium maculatum L.	Wild Geranium	22	21
POLYGALACEAE	MILKWORT FAMILY		
Polygala paucifolia Willd.	Gay-wings		21
P. senega L.	Seneca Snakeroot		21
CELASTRACEAE	STAFF-TREE FAMILY		
Euonymus obovatus Nutt.	Running Strawberry Bush		21
ACERACEAE	MAPLE FAMILY		
Acer negundo L.	Manitoba Maple	46	
A. nigrum Michx. f.	Black Maple		8,21
A. rubrum L.	Red Maple	46	46
A. saccharinum L.	Silver Maple	22,46	46
A. saccharum Marsh.	Sugar Maple	22	18
BALSAMINACEAE	JEWEL-WEED FAMILY		
Impatiens biflora Walt.	Spotted Jewelweed	46	46

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
RHAMNACEAE	BUCKTHORN FAMILY		
Ceanothus americanus L.	New Jersey Tea		21
VITACEAE	GRAPE FAMILY		
Vitis riparia Michx.	Wild Grape	46	46
Parthenocissus vitacea (Knerr.) Hitchc.	Virginia Creeper		21
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	22,17	17
VIOLACEAE	VIOLET FAMILY		
Viola papilionacea Pursh.	Stemless Blue Violet		21
V. pubescens Ait.	Downy Yellow Violet		21
V. rostrata Pursh.	Long-spurred Violet		21
ELEAGNACEAE	OLEASTER FAMILY		
Shepherdia canadensis (L.) Nutt.	Buffalo Berry		21
LYTHRACEAE	LOOSESTRIFE FAMILY		
Lythrum salicaria L.	Purple Loosestrife		19
ONAGRACEAE	EVENING-PRIMROSE FAMILY		
Oenothera biennis L.	Hairy Yellow Evening-primrose		19
Circaea quadrisulcata (Maxim.) Franch. & Sav.	Enchanter's Nightshade	22,46	46

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ARALIACEAE	GINSENG FAMILY		
Aralia nudicaulis L.	Wild Sarsparilla		21
ADIACEAE	CARROT FAMILY		
Sanicula gregaria Bickn.*	Black Snakeroot	46	
S. marlandica L.	Black Snakeroot	22,46	46
Daucus carota L.	Wild Carrot	22	19
CORNACEAE	DOGWOOD FAMILY		
Cornus alternifolia L.fil.	Alternate-leaved Dogwood		21
C. racemosa Lam.	Gray Dogwood	22	
C. rugosa Lam.	Round-leaved Dogwood		21
PYROLACEAE	WINTERGREEN FAMILY		
Monotropa uniflora (L.) Gray	Indian-pipe		21
ERICACEAE	HEATH FAMILY		
Vaccinium angustifolium Ait.	Low Sweet Blueberry		21
PRIMULACEAE	PRIMROSE FAMILY		
Lysimachia ciliata L.	Fringed Loosestrife	46	46
L. nummularia L.	Moneywort		21

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash	*22*,20, 17,46	17,46
F. nigra Marsh.	Black Ash	*22*	17
F. pennsylvanica var. subintegerrima (Vahl) Fern.	Green Ash	*46*	18,46
APOCYNACEAE	DOGBANE FAMILY		
Apocynum cannabinum L.	Hemp Dogbane		21
ASCLEPIADACEAE	MILKWEED FAMILY		
Asclepias exaltata (L.) Muhl.	Poke Milkweed		8
A. syriaca L.	Common Milkweed	*22*	
A. tuberosa L. *	Butterfly-weed		21
POLEMONIACEAE	PHLOX FAMILY		
Phlox divaricata L.	Wild Blue Phlox		21
HYDROPHYLLACEAE	WATERLEAF FAMILY		
Hydrophyllum canadense L.	Canada Waterleaf		21
H. virginianum L.	Virginia Waterleaf	*22*,46	21,46
BORAGINACEAE	BORAGE FAMILY		
Cynoglossum officinale L.	Hound's-tongue		21
Mertensia virginica (L.) DC.*	Virginia Cowslip		8,21
Lithospermum arvense L.	Corn Gromwell		21

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
VERBENIACEAE	VERVAIN FAMILY		
Verbena hastata L.	Blue Vervain	22	
LAMIACEAE	MINT FAMILY		
Glechoma hederacea L.	Ground Ivy	22	21
Leonurus cardiaca L.	Motherwort	46	
Lycopus americanus Muhl.	American Water-horehound	46	46
L. uniflorus Michx.	Water-horehound	46	46
Mentha arvensis L.	Field Mint	46	
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum dulcamara L.	Climbing Nightshade	46	46
OROBANCHACEAE	BROOM-RAPE FAMILY		
Epifagus virginiana (L.) Bart.	Beech-drops		21
PLANTAGINACEAE	PLANTAIN FAMILY		
Plantago major L.	Broad-leaved Plantain	22	19
RUBIACEAE	MADDER FAMILY		
Galium circaezans Michx.	Wild Licorice		21
G. triflorum Michx.	Sweet-scented Bedstraw		21

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Viburnum acerifolium L.	Maple-leaved Viburnum		21
V. lentago L.	Nannyberry		21
V. rafinesquianum Schult.	Downy Arrow-wood	46	21
Triosteum perfoliatum L.	Feverwort		21
Symphocarpius albus (L.) Blake	Snowberry		21
Lonicera canadensis Bartr.	Fly Honeysuckle		21
DIPSACACEAE	TEASEL FAMILY		
Dipsacus fullonum L.	Teasel	22	21
CAMPANULACEAE	HAREBELL FAMILY		
Lobelia inflata L.	Indian Tobacco	46	
ASTERACEAE	ASTER FAMILY		
Solidago altissima L.	Tall Goldenrod	46	46
S. flexicaulis L.	Zig-zag Goldenrod	22	
Aster cordifolius L.	Heart-leaved Aster	46	46
A. lateriflorus (L.) Britt.	One-sided Aster	46	
A. macrophyllus L.	Large-leaved Aster	46	
A. novae-angliae L.	New England Aster	46	19,46
A. puniceus L.	Red-stemmed Aster	46	46
A. simplex Willd.	Panicled Aster	46	46
Antennaria neglecta Greene	Pussytoes		21
Inula helenium L.	Elecampane	22,46	46
Bidens frondosa L.	Beggar-ticks	46	
Leucanthemum vulgare Lam.	Ox-eye Daisy	46	46
Arctium lappa L.	Great Burdock	46	46
A. minus (Hill.) Bernh.	Common Burdock	22,46	46

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	VICINITY
Cirsium arvense (L.) Scop.	Canada Thistle	46	
Taraxacum officinale Weber	Dandelion	46	19,46
Hieracium caespitosum Dumort.	Yellow Hawkweed	46	46
BRYOPHYTES			
RICCIACEAE			
Ricciocarpus natans (L.) Corda		46	

* Denotes that the species is considered to be rare based upon recognized literature sources (See Section 4.4)

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE PI-1N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Great Blue Heron	*Ardea herodias*	1,2, 25,28	16,10,13, 14,29,31
Canada Goose	*Branta canadensis*	1	16,13,9, 32,35,31
Wood Duck	*Aix sponsa*	1	9
Mallard	*Anas platyrhynchos*	1	9,32
Turkey Vulture	*Cathartes aura*	1	13,36
Bald Eagle	*Haliaeetus leucocephalus*	2	
Northern Harrier	*Circus cyaneus*		9
Red-shouldered Hawk	*Buteo lineatus* *		9
Red-tailed Hawk	*Buteo jamaicensis*	38,22	13,9,45
American Kestrel	*Falco sparverius*	2,38	12,13,14, 9,45
Merlin	*Falco columbarius*		13
Ruffed Grouse	*Bonasa umbellus*	1	
Whooping Crane	*Grus americana*	4	12
Killdeer	*Charadrius vociferus*	1	9,13,33
Spotted Sandpiper	*Actitis macularia*		9
Upland Sandpiper	*Bartramia longicauda*		9
Dunlin	*Calidris alpina*	28	
American Woodcock	*Scolopax minor*		9
Rock Dove	*Columba livia*		9
Mourning Dove	*Zenaida macroura*	1,5, 28,38	13,9
Yellow-billed Cuckoo	*Coccyzus americanus*		9
Eastern Screech-Owl	*Otus asio*		8
Great Horned Owl	*Bubo virginianus*	1	8,9
Ruby-throated Hummingbird	*Archilochus colubris*	1,6	13,9
Belted Kingfisher	*Ceryle alcyon*	1	9
Red-headed Woodpecker	*Melanerpes erythrocephalus*		9
Downy Woodpecker	*Picoides pubescens*	22	9
Hairy Woodpecker	*Picoides villosus*		9
Northern Flicker	*Colaptes auratus*	28	13,9
Pileated Woodpecker	*Dryocopus pileatus*	22	9
Eastern Wood-Pewee	*Contopus virens*		9
Willow Flycatcher	*Empidonax traillii*		9
Eastern Phoebe	*Sayornis phoebe*		9
Great Crested Flycatcher	*Myiarchus crinitus*		9
Eastern Kingbird	*Tyrannus tyrannus*		13,9

TABLE 6 (cont'd)

COMMON NAME	LATIN NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
Horned Lark	*Eremophila alpestris*		9
Purple Martin	*Progne subis*	1	
Tree Swallow	*Tachycineta bicolor*	1	9
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		9 9
Barn Swallow	*Hirundo rustica*	1	13,9
Gray Jay	*Perisoreus canadensis*		14
Blue Jay	*Cyanocitta cristata*	1,28, 22	11,13,9, 31,37
American Crow	*Corvus brachyrhynchos*	22	9,45
Black-capped Chickadee	*Parus atricapillus*	1,22	9,13
White-breasted Nuthatch	*Sitta carolinensis*	22	9
House Wren	*Troglodytes aedon*		9
Eastern Bluebird	*Sialia sialis* *		13,32
Wood Thrush	*Hylocichla mustelina*		9
American Robin	*Turdus migratorius*	5,28	13,9,32, 33
Gray Catbird	*Dumetella carolinensis*		9
Brown Thrasher	*Toxostoma rufum*		9
Cedar Waxwing	*Bombycilla cedrorum*		9
European Starling	*Sturnus vulgaris*		9
Warbling Vireo	*Vireo gilvus*		9
Red-eyed Vireo	*Vireo olivaceus*		9
Yellow Warbler	*Dendroica petechia*		9
Magnolia Warbler	*Dendroica magnolia*		9
Ovenbird	*Seiurus aurocapillus*		9
Mourning Warbler	*Oporornis philadelphia*		9
Common Yellowthroat	*Geothlypis trichas*		9
Northern Cardinal	*Cardinalis cardinalis*	1	9,13,14
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		9
Indigo Bunting	*Passerina cyanea*		9
Chipping Sparrow	*Spizella passerina*		9
Clay-colored Sparrow	*Spizella pallida*		9
Field Sparrow	*Spizella pusilla*		9
Vesper Sparrow	*Pooecetes gramineus*		9
Savannah Sparrow	*Passerculus sandwichensis*		9
Grasshopper Sparrow	*Ammodramus savannarum*		9
Song Sparrow	*Melospiza melodia*	38	9
Swamp Sparrow	*Melospiza georgiana*		9
White-throated Sparrow	*Zonotrichia albicollis*		9
Dark-eyed Junco	*Junco hyemalis*	22	

TABLE 6 (cont'd)

COMMON NAME	LATIN NAME	OCCURRENCE AND SOURCES SITE	VICINITY
Bobolink	*Dolichonyx oryzivorus*		9
Red-winged Blackbird	*Agelaius phoeniceus*	1,5	9,13,33
Eastern Meadowlark	*Sturnella magna*	28	9
Common Grackle	*Quiscalus quiscula*		9
Brown-headed Cowbird	*Molothrus ater*		9
Northern Oriole	*Icterus galbula*	1	13,9,14, 32,33
American Goldfinch	*Carduelis tristis*	1	32,9
House Sparrow	*Passer domesticus*		9

* Denotes that the species is considered to be rare based upon recognized literature sources (See Sections 4.4 and 5.5).

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE PI-1N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Eastern Cottontail	*Sylvilagus floridanus*	2,6,28	13,31,36,45
European Hare	*Lepus europaeus*	24	13,27,45
Eastern Chipmunk	*Tamias striatus*		31
Woodchuck	*Marmota monax*		13,27,45
Grey Squirrel	*Sciurus carolinensis*	2	13
Deer Mouse	*Peromyscus maniculatus*		45
Muskrat	*Ondatra zibethicus*	1,2	10,15,33,35,36
Meadow Vole	*Microtus pennsylvanicus*		45
Coyote	*Canis latrans*	2,7,28,22	
Wolf	*Canis lupus*	26	10,13,32,37
Red Fox	*Vulpes vulpes*	7,26	45,8,10,13,37,5
Raccoon	*Procyon lotor*	2,6,7,28,46	13,15,31
Striped Skunk	*Mephitis mephitis*		33
White-tailed Deer	*Odocoileus virginianus*	2,3,6,7,26,28,46	8,10,14,28,34,32,37,33,35

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE PI-1N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Common Snapping Turtle	*Chelydra s. serpentina*		11

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE PI-1N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Brown Trout	*Salmo trutta*		13,41
Brook Trout	*Salvelinus fontinalis*		13,41
Central Mudminnow	*Umbra limi*		42
Goldfish	*Carassius auratus*		33
Carp	*Cyprinus carpio*	26	
River Chub	*Nocomis micropogon*		40
Emerald Shiner	*Notropis atherinoides*		42
Common Shiner	*Notropis cornutus*		41,40,45
Spottail Shiner	*Notropis hudsonius*		45
Blacknose Dace	*Rhinichthys atratulus*		45
Longnose Dace	*Rhinichthys cataractae*		40
Creek Chub	*Semotilus atromaculatus*		45,42,41, 43
White Sucker	*Catostomus commersoni*		45,13,41, 42,43,44
Northern Hog Sucker	*Hypentelium nigricans*		45
Stonecat	*Noturus flavus*		45
Rock Bass	*Ambloplites rupestris*		45
Pumpkinseed	*Lepomis gibbosus*		45
Smallmouth Bass	*Micropterus dolomieui*		45,40,39
Rainbow Darter	*Etheostoma caeruleum*		40
Johnny Darter	*Etheostoma nigrum*		45

DATA SOURCES FOR TABLES 5-9

1. Tomoskey, 1984.
2. Chaput, 1984.
3. Pompa, 1984.
4. Jelinek, 1984.
5. Ford, 1984.
6. Rada, 1984.
7. Mackie, 1984.
8. Regional Municipality of Halton, 1978a.
9. Ontario Breeding Bird Atlas, 1984.
10. Lash, 1984.
11. Marshall, 1984.
12. Dolby, 1984.
13. Gillies, 1984.
14. Vertulia, 1984.
15. Corp, 1984.
16. DaSilva, 1984.
17. Ontario Ministry of Natural Resources, 1978.
18. Proctor and Redfern Limited, 1978.
19. Gartner Lee Associates Limited, 1984c.
20. Halton Region Conservation Authority, 1984.

DATA SOURCES FOR TABLES 5-9 (cont'd)

21. McLaren, 1978.
22. Gartner Lee Associates Limited, 1984a.
23. Regional Municipality of Halton, 1978b.
24. Curtis, 1984.
25. Ketelaars, 1984.
26. Gowland, 1984.
27. Marangoni, 1984.
28. Martin, 1984.
29. Vitetta, 1984.
30. Templeman, 1984.
31. Sum, 1984.
32. Snow, 1984.
33. Rayner, 1984.
34. Mishos, 1984.
35. Jarvis, 1984.
36. Waid, 1984.
37. Love, 1984.
38. Gartner Lee Associates Limited, 1984b.
39. Isbester, 1975.
40. Ontario Ministry of Natural Resources, 1975.

DATA SOURCES FOR TABLES 5-9 (cont'd)

41. Gushal, 1984.
42. Gaetan, 1984.
43. McQuigge, 1984.
44. Stumpf, 1984.
45. Regional Municipality of Halton, 1980a.
46. Bird and Hale Limited, 1985.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site PI-1N from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 10. Interview numbers are related to identifications assigned by Ecologistics Limited during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview forms are contained in Table 11. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mrs. F. Vertulia	60-066	PI-1N (SV)	124-1	- several bird species - deer - harvest wild strawberries and raspberries
Mr. & Mrs. A. Hall	60-062	PI-1N (SV)	86-1a	- none
Mr. George Marshall	60-102	PI-1N (SV)	19-2	- birds, snapping turtle
Mr. Roman Lash	60-009-00	PI-1N (SV)	46-2	- deer, fox, wolves - harvest wild raspberries, blackberries, fiddleheads - fuelwood
Mr. & Mrs. M. DaSilva	60-100	PI-1N (SV)	467-G	- herons, ducks, geese
Mr. & Mrs. J. Rada	60-070	PI-1N (SV)	12-1	- deer and other mammals - several bird species

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Frank Jelinek	60-059	PI-1N (S)	57-1	- harvest strawberries, raspberries and black currents
Mr. & Mrs. B. Pompa	60-027	PI-1N (S)	51-2	- deer - fuelwood
Mr. & Mrs. Kip Chaput	60-030	PI-1N (S)	15-2	- deer, raccoons - several bird species - great blue heron - harvests mushrooms and strawberries
Mr. & Mrs. W. Tomosky	60-067	PI-1N (S)	60-2	- deer - 30 bird species observed
Mr. & Mrs. G. Gillies	60-065 60-064 100-065 60-063-01	PI-1N (SV) PI-1N (S)	217-2	- 20 bird species observed - deer, foxes and other mammal species - fishing and hunting - trout in creek

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. M. Dolby	60-011	PI-1N (S)	27-1	- harvest vegetables and fruit
Mr. & Mrs. C. Ford	60-025	PI-1N (S)	22-1	- several common bird species
Ms. Audrey Curtis	60-071	PI-1N (S)	39-2	- hunting - fuelwood
Mr. Peter Lambrick	60-063 60-059-01 60-056 60-055	PI-1N (S) PI-1N (SV)	292	- none
Mr. Van Wasseneer	60-101 60-098 307-051 307-052 -10	PI-1N (S) PI-1N (SV)	272	- none
Mr. Ken Wettlaufer	60-029 60-069 60-020 60-061 60-019	PI-1N (S) PI-1N (SV)	293	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Ken Wettlaufer (cont'd)	60-057-01 60-056-01 110-012			
Mr. Lloyd Moore	60-024	PI-1N (S)	781	- none
Ms. Beverly Ketelaars	60-034-10	PI-1N (S)	222-1	- blue herons
Mr. Howard Gowland	60-097 60-094-10	PI-1N (SV)	45-2	- deer, foxes, wolves - fuelwood - bass, carp, salmon in creek
Mr. P. Marangoni	60-031	PI-1N (S)	40-2	- fuelwood
Mr. P. Szkilniak	110-009	PI-1N (SV)	35-2	- none
Mr. & Mrs. W. Martin	60-032	PI-1N (S)	21-2	- deer, coyotes - several bird species - harvest dandelions

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. D. DePaoli	60-069	PI-1N (S)	14-2	- none
Vitetta Family and Ms. Rita Leone	60-068	PI-1N (SV)	80-1a	- deer
Mr. Walter Chlon	60-028	PI-1N (S)	238-2	- fuelwood
Mr. & Mrs. Frank Onstein	110-009 60-087 60-088 60-087-01 60-088-01 60-090-01	PI-1N (SV)	265-2	- wolves
Ms. Joanne Templeman	60-099	PI-1N (SV)	459-G	- fuelwood
Mr. John Sum	100-012	PI-1N (SV)	629	- several bird and mammal species - fuelwood - harvest mushrooms

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. A. Mishos	60-023	PI-1N (SV)	18-1a	- deer - several bird species - fuelwood - harvest vegetables
Mr. &Mrs. E. Rayner	60-089 100-015	PI-1N (SV)	418-G	- deer, foxes - several bird species
Ms. Marjorie Jarvis	60-089	PI-1N (SV)	121-2	- deer - geese, great blue herons - fuelwood
Mr. Frank Hagemans	100-010	PI-1N (SV)	419-G	- none
Ms. Jessie Goddard	110-029	PI-1N (SV)	627	- none
Mr. & Mrs Stephen Dolby	100-062	PI-1N (SV)	414-G	- none
Mr. Harold Jarvis	60-058	PI-1N (SV)	2-87	- none

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. Ian Waid	60-104-01	PI-1N (SV)	448-G	- several birds and mammal species - harvest raspberries
Mr. Salo	60-034	PI-1N (S)	37-2	- none
Mr. & Mrs. G. Vanderheyden	50-095	PI-1N (SV)	440-G	- none
Mr. & Mrs. McCann	100-084 100-083 100-012 110-027	PI-1N (SV)	758	- none
Mr. Norm Mogil	306-086	LF-4N* (S)	54-2	- none
Mr. & Mrs. A. Palermo	110-068	LF-4N (SV)	123-1	- harvest wild strawberries
Mr. John Micallef	306-085	LF-4N (S)	204	- none

NOTE: This and the following interviews, described as LF-4N interview forms, cover properties which are also within the PI-1N study zone.

TABLE 10: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-1N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Joe DeAngeles	306-085-10	LF-4N (S)	37-1a	- harvests from garden
Mr. Earl Snow	110-011 110-008 306-084 306-082 306-175	LF-4N (SV)	143-2	- bluebirds and other birds - deer, wolves - fuelwood - harvest mushrooms
Mr. J. Snyder	60-103	LF-4N (SV)	760	- none
Mr. & Mrs. Hall	306-081	LF-4N (SV)	486-G	- deer
Mr. Joseph and Norm Stutt	307-052-10 307-035 60-098	LF-4N (SV)	244-2	- fuelwood

Interview Identification Number: ______

TABLE 11: BIOLOGY QUESTIONS LISTED ON WALK-AND-TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

____
____
____
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2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

____
____
____
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____
____

9.0 BIOLOGY
SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale. Completed data forms and station location maps are in working files at GLAL.

Table 12 is an example of a completed field data form. It is for station 1 on Site PI-1N.

TABLE 12: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - PI-1N

FIELD INVESTIGATIONS

STATION 1 ROLL 1 PHOTO(S) 21

VEGETATION

VEGETATION ASSOCIATION Du FRI DOMINANTS H Hi$_5$ Or, Aw, Id, Bw, Pw,

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species>6m	40	5	Carya ovata Quercus alba Acer saccharum Fagus grandifolia
Tree Species <6m	30	5	Carpinus caroliniana, Betula papyrifera Acer saccharum
Shrub Species >1.5 m	5	5	Cornus racemosa
Shrub Species <1.5 m	5	5	Rubus idaeus var strigosus
Graminoid/Herb Species	unknown	2	
Moss/Lichen Species		2	

Snags/Hectare 5+

Average Canopy Height: FRI 14m, Field 8m Surface Wetness 0 Vegetation Mapping Change ____

Comments / Rare Or Uncommon Species:

WILDLIFE

Blue Jay - 3 (c)
Common Crow - 1 (c)

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____
Approximate Area ____
Shoreline Conditions ____ Bottom Conditions ____
Fish And Invertebrate Species Observed:

Submergent, Emergent Plant Species:
Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.
- immature woods - pole size
- lots of browsing

Page 2 of 18

10.0 OWMC PHASE 4A - BIOLOGY FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2

SEPTEMBER, 1984

Gartner Lee Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

oronto-Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex-06·986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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3.5 FIELD COLLECTION SHEET
3.6 FIELD MAP 1: VEGETATION MAPPING LF-3C-01
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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m². The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m² gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m². Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.0 APPENDICES

3.1 SITE ACCESS PERMISSION FORM

No.________

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ____

____

LANDOWNER:

NAME ____

ADDRESS ____

TELEPHONE NUMBER ________________________________

LANDOWNER CONTACTED BY:

TELEPHONE ____________ DATE OF CONTACT:

MAIL ____________ ________________________

VISIT ____________

PERMISSION TO ENTER PROPERTY:

GRANTED ____________

NOT GRANTED ____________ REASON ____________________

PERMISSION TO COLLECT PLANT SAMPLES:

GRANTED ____________

NOT GRANTED ____________ REASON ____________________

COMMENTS: ____

____

____

____

____

Gartner Lee Associates Limited

Gartner
Lee
Associates
Limited

3.2

FIELD OBSERVATION SHEET | BIOLOGICAL STATIONS : SITE

OWMC 84-S18.2

Gartner Lee Associates Limited

Candidate Site: ____________________

A) Background

Air Photos: ____________________

Photographs Taken:

Roll: ________ Photos: ____________________

Corresponding Maps:

____

____

Observer(s): ____________________

Date Of Visit: ____________________

Time & Duration ____________________

Weather:

Present: ____________________

Previous Day: ____________________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ____________________

Flora: ____________________

Fauna: ____________________

Comments: ____________________

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

• Vegetation Association

Forest:	deciduous	D	Upland = u Lowland = l
	coniferous	C	
	mixed	M	
Thicket:	shrub	T	
Field:	crop land	C	
	recently abandoned	FR	
	old	FO	
	successional	FS	
Others:	marsh	M	
	industrial/residential/manicured	R	

Descriptors:

flooded	(F)
cutover and/or recent secondary succession	(C)
post-fire succession	(P)
grazed	(G)
drained	(D)
plantation	(Pl)

• Surface Wetness

dry	0
moist	1
wet	2

Wildlife

• Observation Code

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

• Type

stream	s
pond	p
diffuse ponding and swales	dp

• Permanence

possibly permanent	p
probably intermittent	pi
intermittent	i

• Turbidity

clear	c
cloudy	cl
turbid	t

• Shoreline Conditions

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

• Bottom Conditions

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

Page ___ of ___

SITE

SITE ____

FIELD INVESTIGATIONS

STATION ____ ROLL ____ PHOTO(S) ____

VEGETATION

VEGETATION ASSOCIATION ____ FRI DOMINANTS ____

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species >6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species <1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ____

Average Canopy Height: FRI ____, Field ____ Surface Wetness ____ Vegetation Mapping Change ____

Comments / Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____

Approximate Area ____

Shoreline Conditions ____ Bottom Conditions ____

Fish And Invertebrate Species Observed: ____

Submergent, Emergent Plant Species: ____

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

Page ____ of ____

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No.______

CANDIDATE SITE ______________________

PROPERTY ROLL NUMBER(S) ______________________

____

LANDOWNER:

NAME ______________________

ADDRESS ______________________

TELEPHONE NUMBER ______________________

LANDOWNER CONTACTED BY:

TELEPHONE ________

MAIL ________

VISIT ________

DATE OF CONTACT:

____

ISSUE(S) TO DISCUSS:

____

____

____

____

____

____

____

REMARKS:

SKETCH MAP:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees.

CONIFEROUS: forest is composed of 80% or more coniferous trees.

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include *Acer saccharum*, *Quercus rubra*, *Q. alba* and *Fraxinus americana*. Common coniferous species include *Pinus strobus*, *Tsuga canadensis* and *Thuja accidentalis*. Coniferous species including *Picca glauca* and *Pinus resinosa* are also encountered in plantations.

In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include Crataegus sp., Cornus racemosa and Spirea alba.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

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Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

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Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).
Others:
WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including *Typha angustifolia* and *Scirpus atrovirens*. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

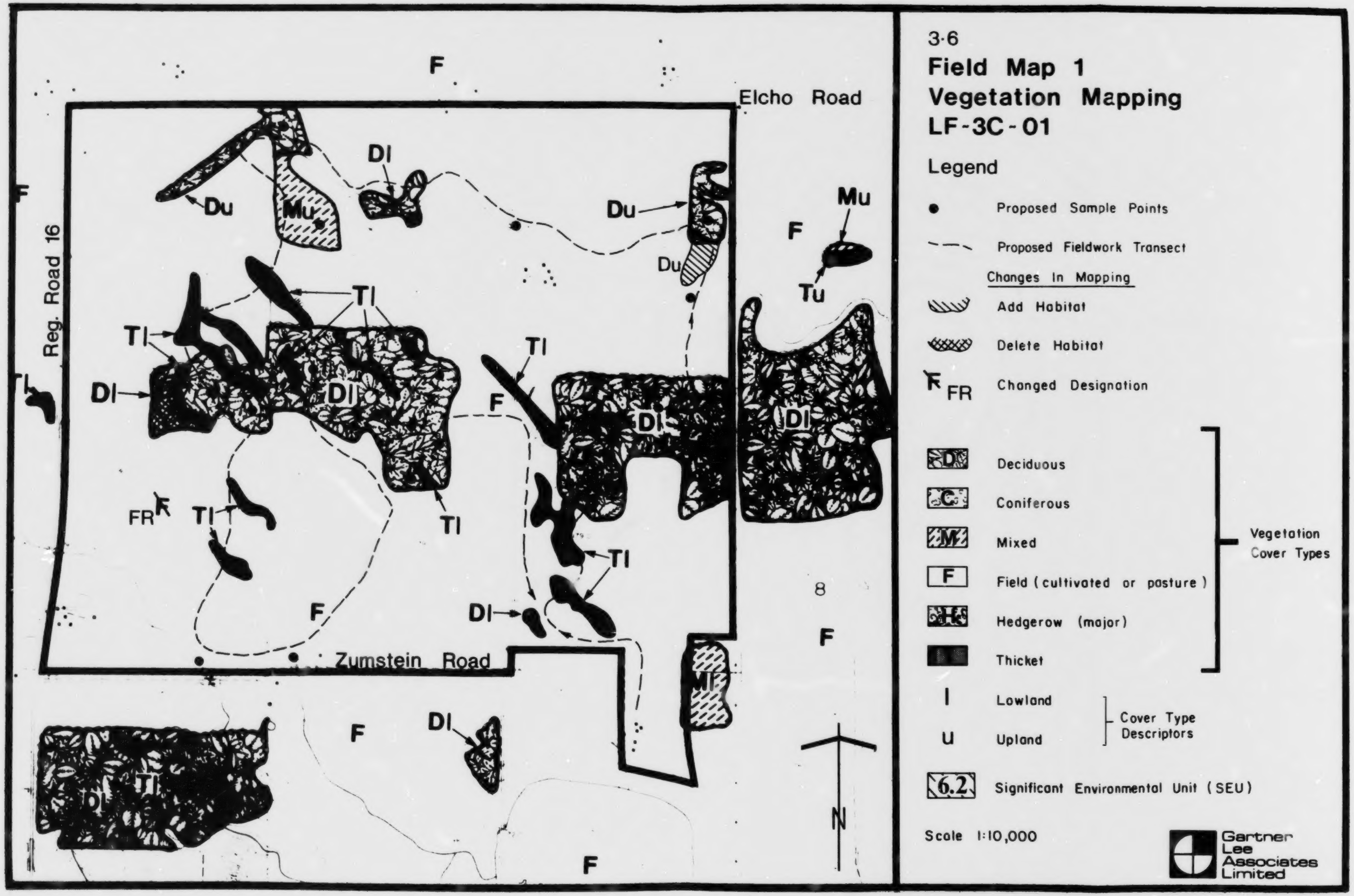
PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

Herbarium / Reseacher / Date

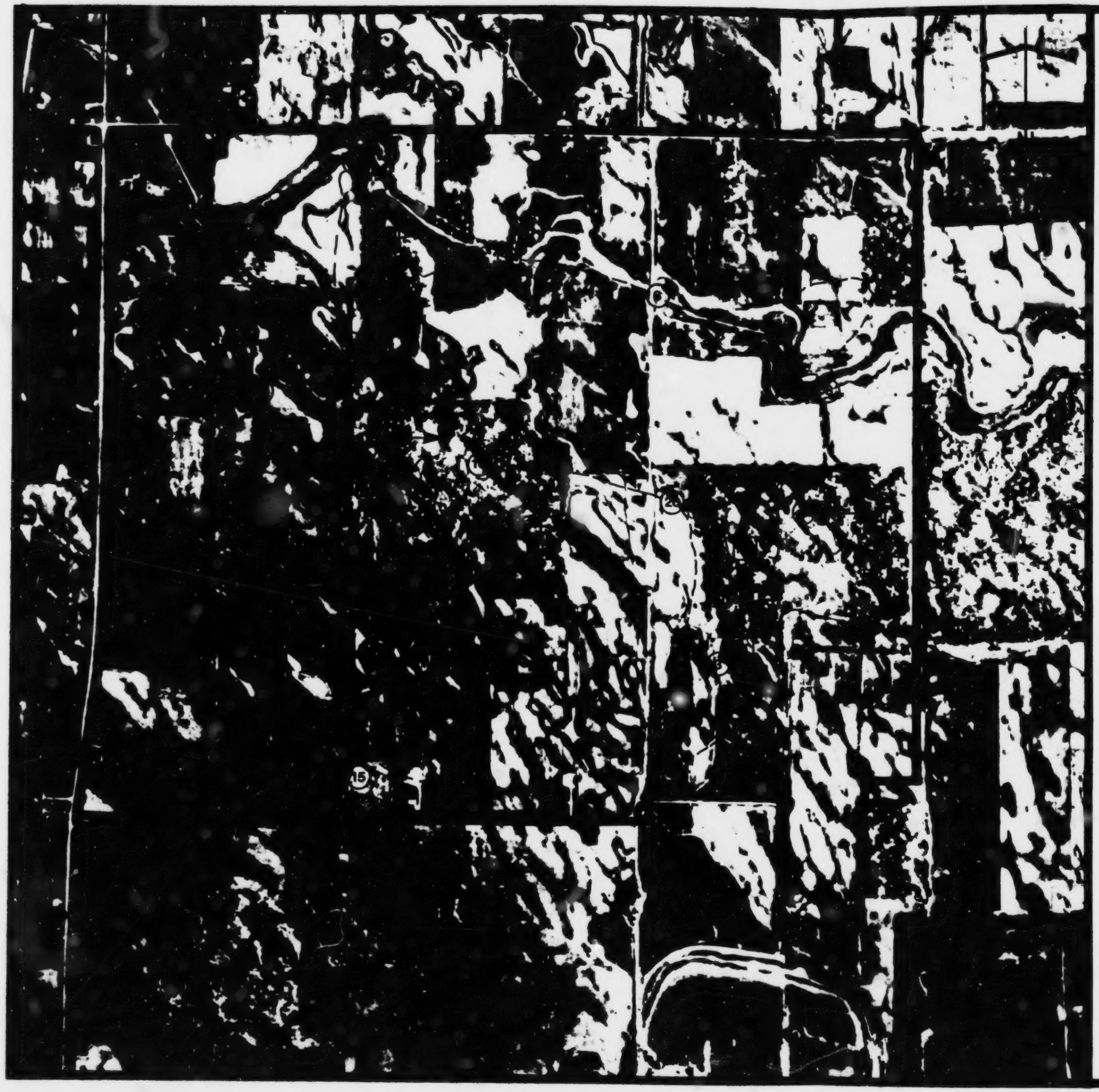
Habitat and Notes												
No.												
Collector												
Date												
Location												
Lot—Con.												
Township												
County												



F
Elcho Road
Reg. Road 16
Zumstein Road
Dl
Du
Mu
Tl
Tu
FR
Ml
8
N
Legend
Proposed Sample Points
Proposed Fieldwork Transect
Changes In Mapping
Add Habitat
Delete Habitat
FR
Changed Designation
D
Deciduous
C
Coniferous
M
Mixed
F
Field (cultivated or pasture)
H
Hedgerow (major)
Thicket
Vegetation Cover Types
l
Lowland
u
Upland
Cover Type Descriptors
6.2
Significant Environmental Unit (SEU)
Scale 1:10,000
Gartner Lee Associates Limited

3·6

Field Map 1
Vegetation Mapping
LF-3C-01



3·7

Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥ Field Observation Station (example)

P6 → Photograph And Direction Taken

- - Transect Followed In Field

MAP NOTES

Scale 1:10,000

Gartner
Lee
Associates
Limited

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Number/
Numéro

8

SITE SELECTION PROCESS PHASE 4A:
TECHNICAL APPENDIX PI-13N -
EXISTING BIOLOGICAL CONDITIONS

A REPORT PREPARED FOR
THE ONTARIO WASTE MANAGEMENT CORPORATION
BY
GARTNER LEE ASSOCIATES LIMITED

THIS REPORT IS ONE OF EIGHT TECHNICAL APPENDICES DESCRIBING BIOLOGICAL CONDITIONS OF THE CANDIDATE SITES. IT SUPPORTS THE COMPARATIVE EVALUATION STUDY REPORT WHICH IS ENTITLED "SITE SELECTION PROCESS PHASE 4A: SELECTION OF A PREFERRED SITE(S) - BIOLOGY".

SEPTEMBER, 1985

PROJECT NO: 85-S18.2

Gartner Lee
Associates Limited

Gartner Lee Associates Limited

Consulting Engineering
Geologists
Biologists and
Hydrogeologists

Toronto-Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex-06-986278

September 17, 1985

Dr. B.D. Mitchell,
Director of Corporate Planning and Development,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2.

Attention: Mr. J.G. Micak,
Manager, Environmental Projects

Dear Dr. Mitchell:

Re: Site Selection Process Phase 4A: Technical Appendix PI-13N - Existing Biological Conditions

We are forwarding the Phase 4A Technical Appendix which describes biological conditions on and in the vicinity of Candidate Site PI-13N.

It is one of eight such technical appendices which provide the basic data to allow the comparative evaluation of the eight candidate sites. To develop a full understanding of how the biological conditions of the candidate sites were compared and the factors applied during Phase 4A, you are referred to the main text of this report entitled "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

We thank you for this opportunity to be of service and trust that this report meets the Corporation's requirements.

Yours very truly

GARTNER LEE ASSOCIATES LIMITED

D S Osmond

for E.G. Anderson, P.Eng.,
Project Director

encl.
EGA:dg

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LETTER OF TRANSMITTAL
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BIOLOGICAL RESOURCES
STUDY TEAM

The study was carried out under the direction of Grant Anderson, Project Director, Gartner Lee Associates Limited (GLAL). The study team consisted of:

Dave Osmond, B.Sc.,Agr.	- Associate and Senior Biologist of GLAL - Report Review
Kenneth Dance, M.Sc.	- Associate and Senior Biologist of GLAL - Report Writing and Project Management
Thomas Hilditch, B.Sc.,Agr.	- Biologist of GLAL - Data Collection
Donald Fraser, M.Sc.	- Biologist of GLAL - Site Report Preparation
Wayne Weller, M.Sc.	- Biologist of GLAL - Data Collection

SUMMARY

This technical appendix describes the existing biological conditions on Site PI-13N and in the site vicinity. It is intended to verify and refine Phase 3B findings and to serve as biological input to the comparative evaluation of siting options.

Data were compiled from a variety of sources, including published and unpublished reports, interviews with government agency personnel and local residents, and on-site field surveys.

Five natural vegetation cover types occur on the site, including examples of both upland and lowland deciduous forest. No special vegetation associations are present. A portion (less than one hectare) of a Significant Environmental Unit occurs on-site.

A total of 119 plant species is known from Site PI-13N, of which one is considered rare. Wildlife related data indicate the presence of 50 bird species, 11 mammals, five reptiles and amphibians, one fish and six butterflies and moths. One bird species and two butterfly species are considered rare.

Forestry related activities include fuelwood harvesting and maple syrup extraction. No mammal trapping or fishing takes place and hunting is a minor activity.

A portion of one Significant Environmental Unit occurs within the PI-13N site vicinity.

Six rare plant species, three rare birds, one rare mammal, one rare reptile, and one rare butterfly have been recorded in the site vicinity.

1.0 INTRODUCTION

1.1 BACKGROUND

The Ontario Waste Management Corporation (OWMC) is involved in a five-phase process for the selection of a siting option for facilities to treat liquid industrial and hazardous wastes. This process has incorporated input from a number of areas of expertise including agriculture, biology, hydrogeology, socioeconomics and transportation.

At the end of the third phase of the site selection process, eight candidate sites within the Golden Horseshoe region of southern Ontario were identified (OWMC 1984). Biological factors developed to fulfill OWMC's goal of minimizing environmental impact were among several factors used in selecting the eight candidate sites. Gartner Lee Associates Limited completed the technical input for biology as reported in "Site Selection Process, Phase 3B: Selection of Candidate Sites - Biology" (GLAL 1984e). In that report, Site PI-13N was thought to possess major biological constraints.

This report is a technical appendix to "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology" that documents and interprets field data and available biological information for Site PI-13N. It serves as a data base for comparing the eight candidate sites in the facility siting selection process.

1.2 SCOPE AND OBJECTIVES

As noted earlier, the previous Phase 3B evaluation of Site PI-13N was based primarily on existing data. For this Phase 4A assessment, the existing data base has been up-graded where possible and field work has been conducted on the site. The sampling and analytical elements of the program have been designed to meet study objectives and to provide an adequate basis for site comparisons.

Objectives of the Phase 4A biology study are:

- to describe existing biological conditions, on-site and in the site vicinity;
- to refine and confirm the Phase 3B data base through contact with pertinent agencies, experts and the public for both the site and site vicinity, and through field work on-site;
- to determine the level of constraint associated with biological resources;
- to assess the sensitivity and significance of biological resources; and
- to provide the Site Selection Team with biological assessments to use in refining site boundaries and in the siting option comparison.

1.3 REPORT CONTENT

Data sources and study methods are outlined prior to describing the regional setting and specifics of the site location. An overview of the existing biological conditions on the site is provided in sections dealing with rare species, fish and wildlife communities, natural vegetation patterns, and biological resource use.

The presentation of these data generally follows a sequence of biology factors and their respective indicators. Biology factors refer to impact considerations. Factors are subdivided into indicators. Indicators are ways of more precisely identifying, describing and predicting impacts. Biology factors and indicators are defined in detail in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

The bulk of the existing biological information for Site PI-13N is summarized on two maps and in eleven tables. Sections 1.0 through 5.0 comprise the main text of the report. Section 6.0 onward contains supporting data.

2.0 STUDY METHODS

The methodology employed in the collection, compilation and interpretation of the information base presented in this technical appendix is described below and illustrated in Figure 1.

2.1 DATA SOURCES AND DATA COLLECTION METHODS

The following sources of information were used:

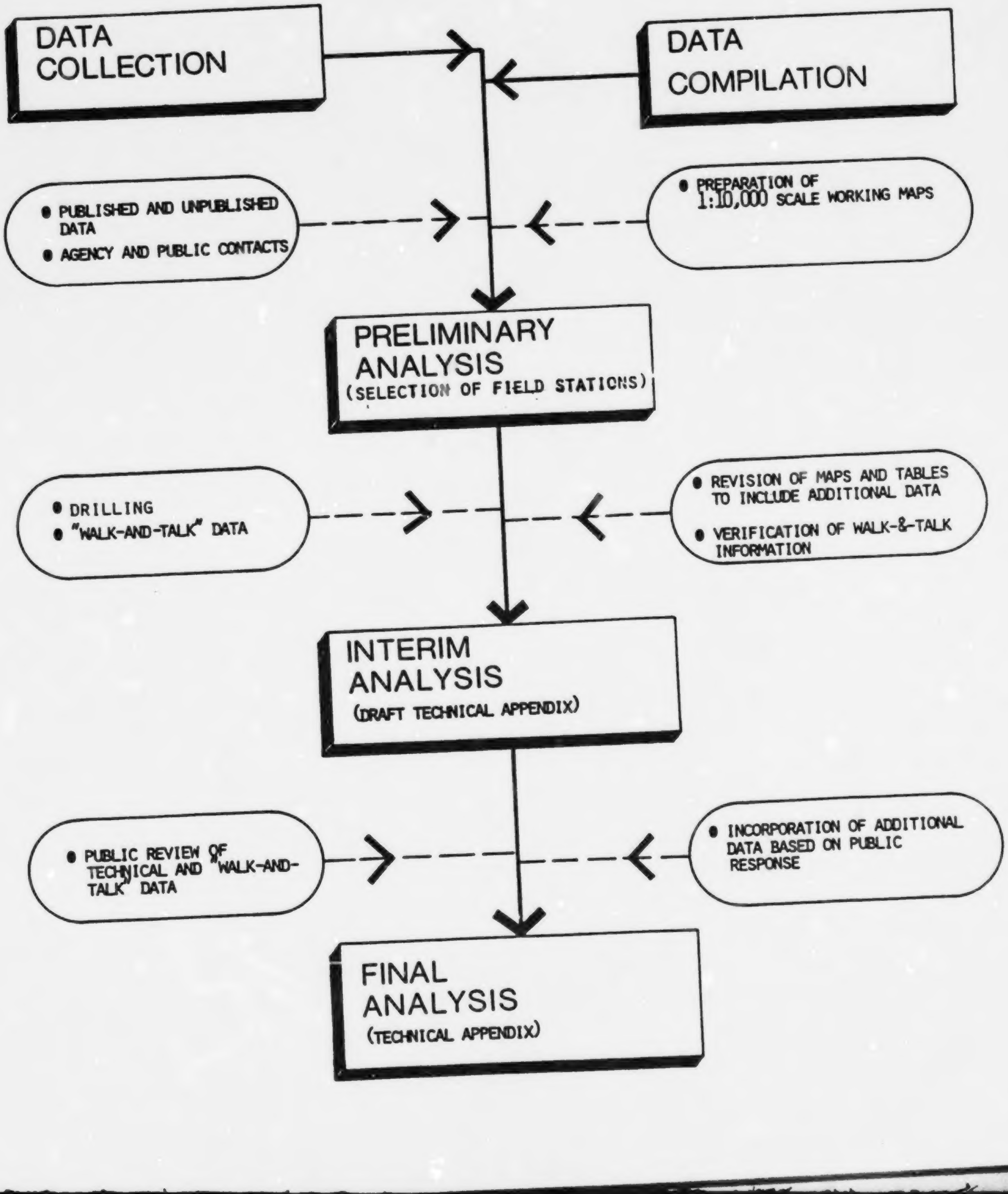
- primary data base assembled during previous study phases;
- scientific literature, e.g. regional floras;
- published and unpublished reports, maps and "open file" reports;
- interviews with government agency personnel, local residents, naturalists and trappers, and
- on-site field surveys.

2.1.1 EXISTING REPORTS:

For all of the study units (site and site vicinity) existing literature, reports and existing data bases were primary sources of information. During Phase 3B, research had concentrated on regional studies which focussed on significant environmental areas. During Phase 4A, potential sources of information on the biology of sites and surrounding areas were researched. Scientific literature which reports the occurrence of species near the candidate sites and the regional status of these species was reviewed.

Figure 1

Methodology Flow Chart


DATA COLLECTION
DATA COMPILATION
• PUBLISHED AND UNPUBLISHED DATA
• AGENCY AND PUBLIC CONTACTS
• PREPARATION OF 1:10,000 SCALE WORKING MAPS
PRELIMINARY ANALYSIS (SELECTION OF FIELD STATIONS)
• DRILLING
• "WALK-AND-TALK" DATA
• REVISION OF MAPS AND TABLES TO INCLUDE ADDITIONAL DATA
• VERIFICATION OF WALK-&-TALK INFORMATION
INTERIM ANALYSIS (DRAFT TECHNICAL APPENDIX)
• PUBLIC REVIEW OF TECHNICAL AND "WALK-AND-TALK" DATA
• INCORPORATION OF ADDITIONAL DATA BASED ON PUBLIC RESPONSE
FINAL ANALYSIS (TECHNICAL APPENDIX)

Government reports on vegetation and fish and wildlife resources were obtained from the Ministry of Natural Resources, the Halton Region Conservation Authority, the Regional Municipality of Halton, and other government agencies.

Breeding bird data were obtained from the Ontario Breeding Bird Atlas Project. These data covered the period 1981-1983 inclusive.

Reports specific to Site PI-13N are referenced in the text and are listed in Section 6.0.

2.1.2 INTERVIEWS:

Additional information regarding site biology and biological resource use was obtained during interviews with government agency personnel, trappers, naturalists, and local residents. The results of the interviews are presented in the summaries prepared for agency meetings (by GLAL) and on resident interview forms. These forms contain questions which were prepared by GLAL, however the interviews themselves were undertaken by Ecologistics Ltd. as part of the "Walk-and-Talk" program.

Meetings were held with a local public interest group made up of residents and other interested individuals. The group identified items of biological interest. Summaries of meetings and interview forms are in GLAL files. Biology and biological resource use information summarized from the interview forms is tabulated in Section 8.0.

2.1.3 FIELD SURVEYS:

As is evident from Figure 1, a number of activities occurred prior to on-site field work. Data maps were prepared from existing data and were reviewed with resident groups. This step was an integral element in the study process and always preceded contacting landowners to obtain permission to undertake on-site investigations. Meetings to discuss biology with resident groups were co-ordinated with those of the Gartner Lee hydrogeologists.

Once all of the aforementioned steps had been completed, field sampling procedures were developed for each site. Vegetation cover type maps prepared during Phase 3B and recent aerial photos were reviewed as background to developing a sampling regime for the site. Field work was conducted on all the candidate sites. Existing data collected during Phases 3B and 4A, air photos, and discussions with knowledgeable experts were relied upon as sources of biological information for the site vicinity study area.

Details of the field sampling procedures are presented in "OWMC Phase 4A - Biology Field Protocol" (GLAL 1984d), included as Section 10.0. An example of a completed field data form is contained in Section 9.0.

Key elements of the site field work included:

- confirmation of vegetation cover types as determined from air photo interpretation;

- checking of vegetation boundaries to determine whether recent forest clearing had altered forest edges;
- recording the number of vegetation strata present and the percent cover of each stratum;
- recording the key vegetation species at each sampling station;
- preparation of a plant species list;
- collection of plant specimens;
- mapping locations where rare or uncommon plants were observed;
- recording wildlife species observations;
- descriptions of aquatic habitat units; and
- photographs of typical vegetation associations and other key features (available in GLAL files).

Where important features were known prior to field work, efforts were made to check these.

Reconnaissance field studies on Site PI-13N were conducted on September 26, 1984. Other visits to the site by GLAL biologists occurred on May 15 and 18, June 25, July 19, September 27 and November 6, 1984.

2.2 DATA COMPILATION AND ANALYSIS METHODS

Mapping and tabulation of data were used to compile the information collected. All of the working maps and tables referred to below are contained in GLAL files. Vegetation cover type data determined from air photos, FRI (Forest Resource Inventory) maps and field work (site only) were mapped first at a scale of 1:10,000 for both the site and site vicinity study areas.

Agency data, literature and "Walk-and-Talk" interview data were reviewed and key biology features and biological resource uses were also mapped at 1:10,000. These "first generation" maps were reviewed with the Site PI-13N citizens group on July 18, 1984.

Data from trappers, bait fishermen and naturalists were compiled on maps and in tables or summaries of meetings. Ontario Breeding Bird Atlas data were assembled in summary tables. Significant pieces of information extracted from these sources contributed to the preparation of a series of "second generation" data maps.

Results of site field work were reviewed and were first summarized on 1:10,000 scale working maps which showed locations of rare or uncommon plant species, changes in vegetation boundaries and areas where forest cutting has occurred recently.

Vegetation cover type maps which were prepared at 1:10,000 scale for both the site and site vicinity study zones were compared with those of Ecologistics Limited, who plotted "crop" and "non-crop" areas. When this cross-check was complete, detailed cover type maps for the site were prepared on a 1:5,000 scale photomosaic base. Areal extent of each cover type was tabulated for both the site and site vicinity.

Species lists were used to summarize species occurrence data gleaned from information sources, both for the site and site vicinity. Species lists are presented in Tables 5 through 10. These lists should be considered preliminary and may be incomplete.

Locations of significant fish and wildlife features were noted on the "second generation" data maps.

Significant biological data were summarized on two maps (Figures 3 and 4) which accompany this technical appendix. Figure 3 contains site-related information mapped at an original scale of 1:5,000 and Figure 4 contains site vicinity-related information mapped at an original scale of 1:10,000.

All "Walk-and Talk" data were compiled in tabular form (Section 8.0) and were recorded on an overlay of a 1:10,000 map base.

Biology data pertaining to sections of rail alignments and access roads which fall within the PI-13N site and site vicinity were compiled in working tables and on maps. These data were used in the analyses of rail and road options, the results of which are contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

2.2.1 ASSESSMENT OF SPECIES SIGNIFICANCE:

Using a working knowlege of the status and distribution of plants and animals in Canada, Ontario, and the Regional Municipality of Halton, species lists were reviewed to tentatively identify those taxa worthy of a "rare" designation. Once a preliminary list of rare species had been identified, a more critical evaluation of the occurrence/report was made. Particular attention was given to those not confirmed by GLAL field work. Factors such as the circumstances surrounding the observation, the experience of the observer, the existence of concrete

evidence such as a photograph and/or specimen, and the potential for confusion with similar but more common species were considered. Where available, literature dealing with the national, provincial and regional status of the species was reviewed.

Working files were prepared which contain a final assessment of species status. Rare species are highlighted in Tables 5 through 10 with asterisks and are discussed in greater detail in Sections 4.4 and 5.5.

Species occurrences which were discounted during the noteworthy species evaluation were not dealt with further. Reports of nesting by the following 16 species of birds (Omagh United Taxpayers 1984a, 1984b) were considered erroneous in light of the known breeding distributions and/or habitat requirements of these taxa.

Black-crowned Night-Heron	(*Nycticorax nycticorax*)
Lesser Scaup	(*Aythya affinis*)
Common Merganser	(*Mergus merganser*)
Red-breasted Merganser	(*Mergus serrator*)
Ruddy Duck	(*Oxyura jamaicensis*)
Northern Goshawk	(*Accipiter gentilis*)
Rough-legged Hawk	(*Buteo lagopus*)
Golden-crowned Kinglet	(*Regulus satrapa*)
Ruby-crowned Kinglet	(*Regulus calendula*)
Northern Shrike	(*Lanius excubitor*)
Solitary Vireo	(*Vireo solitarius*)
Yellow-rumped Warbler	(*Dendroica coronata*)
Blackburnian Warbler	(*Dendroica fusca*)

Pine Warbler	(Dendroica pinus)
American Tree Sparrow	(Spizella arborea)
Fox Sparrow	(Passerella iliaca)

Reports of Eurasian Skylark (Alauda arvensis), Black-throated Sparrow (Amphispiza bilineata) and Pine Snake (Pituophis melanoleucas) on and in the vicinity of Site PI-13N (Omagh United Taxpayers 1984a) are not credible, given that none of these taxa have ever been recorded in Ontario.

The American Black Bear (Ursus americanus), American Marten (Martes americana) and Wolf (Canis lupus) have all been extirpated from southern Ontario. Reports of these mammals in the site vicinity (Omagh United Taxpayers 1984a, 1984b) are either misidentifications or refer to historical records and thus have no bearing on the present study.

2.2.2 DETERMINATION OF RARITY:

Rarity is a measure of the limited size and distribution of a species population. It is a term subject to a variety of definitions, some based on quantitative analyses, others based on subjective, qualitative interpretations. Generally, however, rarity relates to very small populations or scattered, localized distributions of flora and fauna. Causes of rarity include habitat loss or alteration, direct exploitation by man, indirect impact by man, historically low populations, and extremely restricted habitat.

In assessing rare animals, greater significance was attached to faunal species which utilize Site PI-13N and vicinity during a critical stage in their life cycle. For example, only evidence of breeding exhibited by a rare bird species was considered to be of significance. The mere presence of non-breeding or transient individuals was insufficient justification for assigning a rare status.

In the case of plants, the occurrence of rare, non-native flora was also not considered significant, and accordingly these species are not addressed in the text.

Rarity is subject to several different definitions when considered within a specific geographical context. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assigns "Rare", "Threatened" and "Endangered" status on a national level. "Endangered" species in Ontario are designated under the Ontario Endangered Species Act (Ontario Government 1971). Definitions of provincial and regional rarity are derived from a number of published and unpublished sources.

A detailed discussion of definitions developed by these sources is provided in Section 7.1.

2.2.3 SUMMARY:

With the completion of the field work, data analysis and public survey programs, the working maps were revised to incorporate the additional information that was collected.

A further public meeting to review the preliminary biological information was held on 7 May 1985. Additional data resulting from public responses were incorporated in the final report.

This technical appendix represents the interpretation of biological features and biological resource use at Site PI-13N to date and forms part of the technical basis for the comparative evaluation of the siting options contained in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

3.0 SETTING

3.1 REGIONAL SETTING

Site PI-13N is located in the Regional Municipality of Halton. Its position relative to the other seven OWMC candidate sites is indicated in Figure 2.

3.2 SITE LOCATION AND PHYSICAL SETTING

The site proper is defined as the area falling within acquisition boundaries as portrayed on maps contained in the OWMC Phase 3B Report (OWMC 1984). The site is shown on Figure 3. It is 170 ha in size and includes Lots 3 and 4, Concession 6, Town of Milton, (formerly in the Township of Trafalgar), Regional Municipality of Halton. It is bounded on the east and west by Sixth Line and Fifth Line, respectively and is approximately 0.5 km south of Brittania Road West.

The site is located approximately 6.0 km southeast of the Town of Milton and is approximately 18 km northeast of Oakville. Access is via Highway 401 and regional roads from the north and the Queen Elizabeth Way and regional roads from the south.

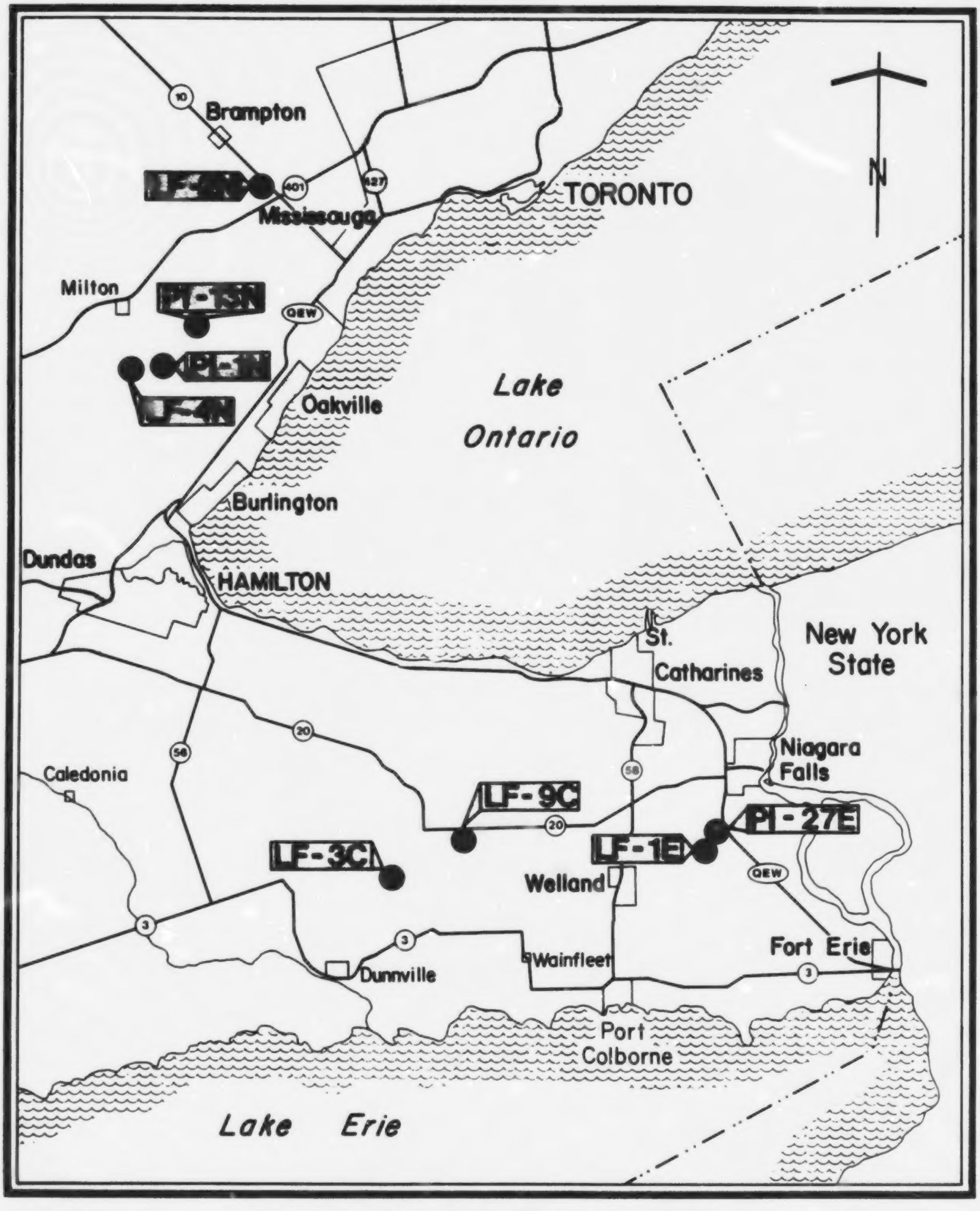

Brampton
10
401
427
TORONTO
Mississauga
N
Milton
QEW
PI-1N
LF-4N
Oakville
Lake Ontario
Burlington
Dundas
HAMILTON
St. Catharines
New York State
20
56
Caledonia
Niagara Falls
LF-9C
PI-27E
LF-3C
LF-1E
QEW
Welland
3
Wainfleet
Fort Erie
Dunnville
Port Colborne
Lake Erie
Miles 8 0 8 16
Kilometres 10 0 10 20

FIGURE 2 LOCATION OF CANDIDATE SITES

4.0 EXISTING
BIOLOGICAL RESOURCES - SITE

Existing biological resources are described under headings which represent the more significant biological characteristics. In many instances, site-related factors and indicators are used to organize the discussion.

4.1 OVERVIEW OF SITE BIOLOGY

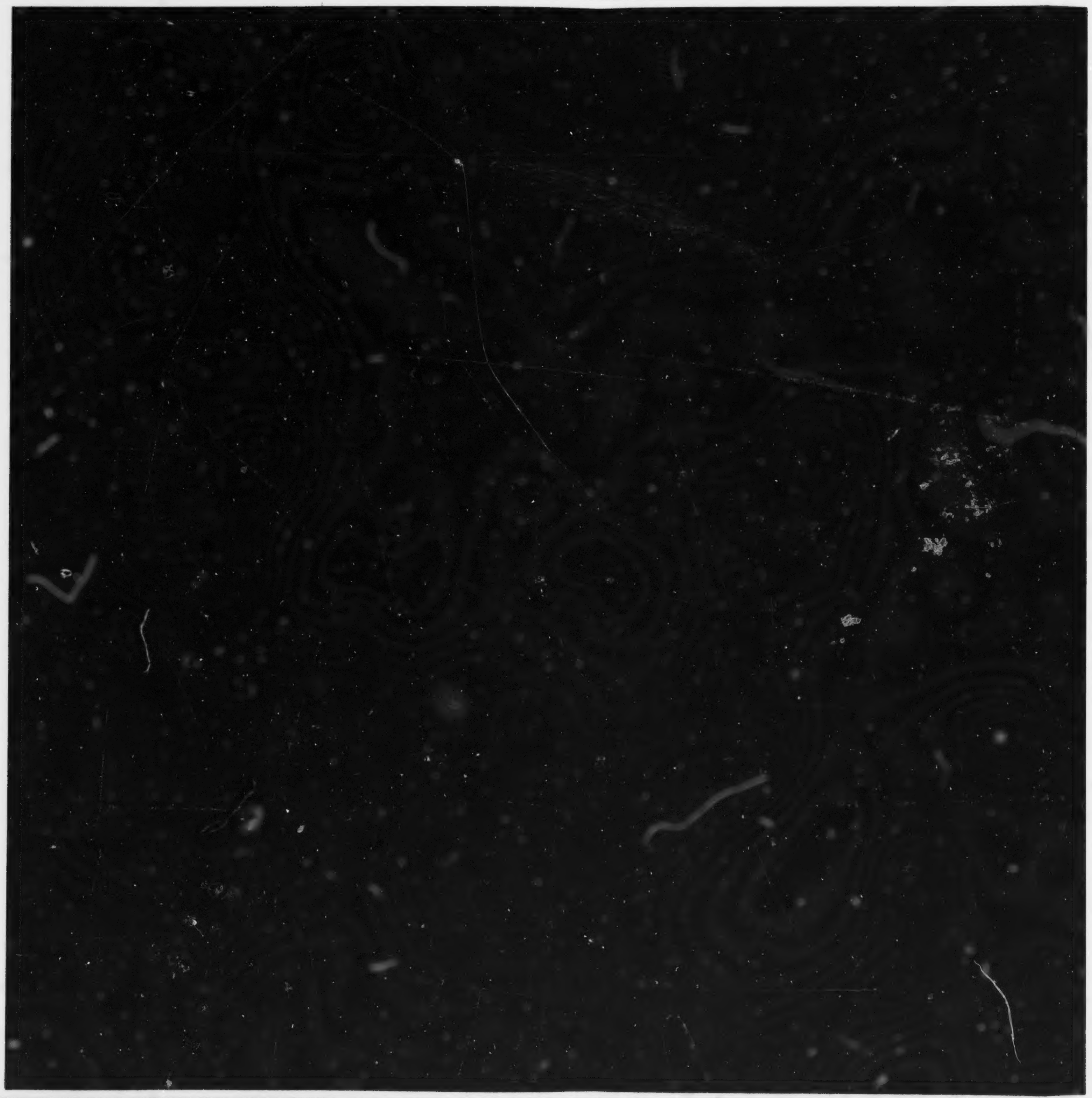
Three small deciduous woodlots occur on the site (Figure 3) and collectively occupy approximately 2% of the site area. The dominant overstory species are noted in Section 4.2.2.

Areas of lowland thicket, recently disturbed field, old field and marsh are also present. Approximately 95% of the site is currently in agricultural production.

Fifty bird species have been recorded within the acquisition area, 28 of which may utilize the area for nesting purposes. Eleven species of mammals, five species of reptiles and amphibians, one species of fish and six species of moths and butterflies have also been recorded from the site.

4.2 NATURAL VEGETATION COMMUNITIES

For ease of presentation, data for two indicators of the natural vegetation communities factor have been amalgamated in Section 4.2.2.



Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

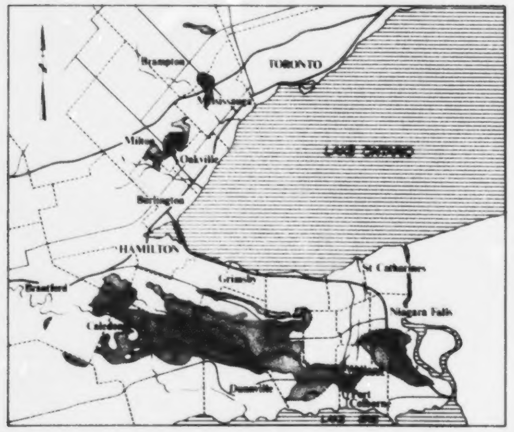
ANIMALS	PLANTS
W Whip-poor-will	Ⓑ Bu Buttonbush
Vw West Virginia White	
Sn Snout Butterfly	

▧ Special Vegetation Association/Significant Environmental Unit

5·2 — Unit number
— Candidate area number

▬ Phase 3B Acquisition Boundary

Key Map: PI-13 North


Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
St Catharines
Brantford
Grimsby
Niagara Falls
Caledonia
Dunnville
Port Colborne
LAKE ERIE

N

Scale Bar 500 0 500
250 0 250

EXISTING BIOLOGICAL CONDITIONS PHASE 4A

Vegetation and Fish and Wildlife Features on Site

September 1985 **Figure 3**

4.2.1 SPECIES LIST:

A total of 119 plant species has been recorded on Site PI-13N. Table 5 (Section 7.0) lists the common and scientific names of each plant recorded and notes the source of the observation.

4.2.2 AREAL EXTENT OF NATURAL VEGETATION PATCHES AND VARIETY OF COVER TYPES:

The lands on the site have been classified according to their vegetation association or cover type. Table 1 summarizes the areal extent of each cover type. Five natural vegetation associations are present on Site PI-13N. Cropland and unclassified land are not considered to be examples of natural vegetation cover types. Associations are defined by both structural and dominant species distinctions and are described under four major cover type headings:

Forest

The dominant forest cover on the site is upland deciduous, with an area of 3 hectares. It occurs in three small units on the site. The woods in the southest corner are closely associated with a tributary of East Sixteen Mile Creek (also known as East Oakville Creek). The lowland deciduous component occupies less than one hectare and is distributed between the two small woodlots in the north half of the site.

The deciduous lowland component is dominated by Red Maple (*Acer rubrum*), American Elm (*Ulmus americana*), Silver Maple (*Acer saccharinum*), Black Willow (*Salix nigra*), and Peachleaf Willow (*Salix amygdaloides*).

TABLE 1: AREAL EXTENT OF VEGETATION COVER TYPES ON SITE PI-13N

VEGETATION COVER TYPE	APPROXIMATE AREA * (ha)
Natural Vegetation	
Upland Deciduous Forest	3
Lowland Deciduous Forest	<1
Lowland Shrub Thicket	<1
Old Field	1
Marsh	<1
Other	
Cropland	159
Unclassified	4
TOTAL	170

* Areas are approximate and are rounded to whole numbers. Cropland area was determined by subtracting the total of all other cover type areas from the total site area.

The upland deciduous forest is dominated by Red Oak (Quercus rubra), Sugar Maple (Acer saccharum), White Ash (Fraxinus americana) and Shagbark Hickory (Carya ovata).

Thicket

Less than one hectare of lowland thicket occurs in a wet pocket in the northeast corner of the site. It is dominated by Buttonbush (Cephalanthus occidentalis).

Marsh

Less than one hectare of marsh is present on the site. It occurs in two locations, the vegetation complex in the northeast corner of the site and the small valley in the southeast corner.

The marsh is dominated by narrow-leaved emergents including Blunt Spike Rush (Eleocharis obtusa), Reed Canary Grass (Phalaris arundinacea), Soft Rush (Juncus effusus) and sedges (Carex crinita, C. lupulina, and C. vulpinoidea).

The dominant free-floating plant in this habitat type is Star Duckweed (Lemna trisulca).

Field

Only one hectare of old field is present on the site, associated with the small valley in the southeastern corner. It is dominated by native herbaceous vegetation.

4.2.3 NUMBER AND EXTENT OF SPECIAL ASSOCIATIONS AND SIGNIFICANT ENVIRONMENTAL UNITS:

Special associations are significant natural vegetation complexes which are of limited distribution. Distribution may be limited because the association requires specific environmental conditions which are present in only a few localities and/or because its former distribution has decreased as a result of modern land use practices. Examples of special associations include prairie relicts, savannas and alvars.

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definition of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

No special vegetation associations occur on Site PI-13N.

A very small (less than one hectare) portion of SEU 5-2 (Sixteen Mile Creek Valley) occupies the easternmost corner of the site (Figure 3). This river valley has been identified as an ANSI (Ontario Ministry of Natural Resources 1983b), as an AIBR (OMNR 1983a), and as an Environmentally Sensitive Area (Regional Municipality of Halton 1978a) and is described in greater detail in Section 5.2. It is doubtful whether the small wooded area on site supports all the significant environmental features associated with this SEU.

The woods are primarily immature, as indicated by the dominance of pole-sized material. The area appears disturbed, evidenced by a small refuse pile at the ravine edge.

4.3 FISH AND WILDLIFE COMMUNITIES

4.3.1 SPECIES LIST:

Fifty bird species, 11 mammal species, five reptile and amphibian species, one fish species and six butterfly and moth species have been recorded on Site PI-13N. Master species lists are presented in Tables 6 through 10.

4.3.2 EXTENT AND TYPES OF AQUATIC HABITAT:

Wetland habitat on Site PI-13N is represented by four scattered patches of marsh, which collectively occupy less than one hectare. An intermittent, unnamed tributary of East Sixteen Mile Creek is the only watercourse on the site and flows through the extreme eastern corner of the site. Although direct utilization of this aquatic habitat is not documented, small fish, amphibians and marsh birds probably occur in season.

4.3.3 EXTENT AND TYPES OF TERRESTRIAL WILDLIFE HABITAT:

Five natural vegetation cover types occur on Site PI-13N. Areas of cropland and unclassified land are also present. The approximate area of each cover type is indicated in Table 1.

Wildlife species diversity and population density on Site PI-13N cannot be directly determined at this time. However, given the size and structure of these vegetation cover types, some inferences may be made concerning their significance as terrestrial wildlife habitat.

Fields

Ninety-five percent of Site PI-13N (159 ha) is currently in agricultural production. These croplands are important to some wildlife species (e.g. White-tailed Deer (Odocoileus virginianus) and granivorous birds) as food sources but rarely support nesting birds.

Old field habitat on Site PI-13N (1 ha) appears to be of insufficient size to support a distinct association of breeding birds and mammals.

Forests

The interface between field and forest habitats is occupied by "edge" species. Although narrow, the "edge" ecotone typically provides the greatest diversity of vegetation types and thus supports a correspondingly high number of wildlife species (Taylor and Taylor 1979).

The breeding bird community associated with "edge" species on Site PI-13N is likely a small but overlapping one, comprised of both field and forest dwellers. Woodlot margins are also favoured by Coyotes (Canis latrans), Red Fox (Vulpes vulpes) and deer.

The structure and diversity of the breeding bird community associated with the deciduous forest types on Site PI-13N is strongly influenced by the vertical complexity of the vegetation.

The west-central portion of the site contains a small woodlot comprised of both upland and lowland deciduous associations. The lowland component has attained an intermediate stage of succession characterized by stands of pole-sized Silver Maples and willows with a moderately dense understory of saplings and shrubs. The upland deciduous woodland is more mature.

The avian niches provided by second-growth woods are typically suited for occupation by insectivores and omnivores (Samson 1979). Most forage on the ground or at a low elevation. Canopy dwellers are probably absent from this immature forest type. Typical breeding birds which may be associated with the upland and lowland deciduous woods on Site PI-13N include Downy Woodpecker (Picoides pubescens), Northern Flicker (Colaptes auratus), Brown Thrasher (Toxostoma rufum), American Robin (Turdus migratorius), and Yellow Warbler (Dendroica petechia).

The avian niches provided by more mature oak/maple forests (3 ha) are primarily suited for occupation by insectivorous birds. The absence of shrub cover throughout these mature wooded areas eliminates the presence of some ground feeders and understory foliage gleaners.

Thicket

A small pocket of lowland thicket in the north-central portion of the site may provide nesting habitat for Willow Flycatchers (Empidonax traillii), Yellow Warblers, Common Yellowthroats (Geothlypis trichas) and Swamp Sparrows (Melospiza georgiana).

Marsh

Marsh habitat is dominated by an association of low grasses, rushes, and sedges which may support nesting Bobolinks (Dolichonyx oryzivorus). Red-winged Blackbirds (Agelaius phoeniceus) may nest wherever robust emergents such as cattails occur.

4.3.4 NUMBER AND SIGNIFICANCE OF SPECIAL HABITATS:

Special habitats are defined as areas where concentrations of certain species occur during critical periods of their life cycles. Examples of special habitats include deer yards, waterfowl staging areas, heronries and fish spawning beds. No special habitats are known to occur on Site PI-13N.

4.4 RARE SPECIES

4.4.1 INTRODUCTION:

Review of the master species lists allowed isolation of those floral and faunal taxa worthy of a "rare" designation. These are indicated in Tables 5 through 10 by means of an asterisk (*) placed behind the species' scientific name. Definitions of rarity and the rationale/significance of this biology factor are detailed in Sections 2.2 and 7.1 of this technical appendix and in Volume I.

To make information presentation more logical, indicators of rare species are not used to divide the discussion. Rather, rare species discussions are organized by life form (animals and plants) and species. Each indicator is addressed within each species discussion.

The approximate locations of rare species occurring on the site are mapped in Figure 3 at an original scale of 1:5,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species where, for example, several individuals are found in close proximity to one another. Information concerning actual numbers of individuals of rare species and their on-site distribution is presented later in this section and in Table 2.

However, it should be emphasized that existing rare species data are based on preliminary investigations. Further on-site field work could result in an increase in both the numbers and individuals of rare species.

4.4.2 RARE ANIMAL SPECIES:

One rare bird species and two rare butterfly species have been reported on Site PI-13N. The approximate locations of these sightings are indicated on Figure 3.

Whip-poor-will (Caprimulgus vociferus)

Once common and widespread in southern Ontario, Whip-poor-wills are now "quite scarce in agricultural areas" (Peck and James 1983). Although the species is known to nest in Halton R.M. and will utilize small woodlots, the likelihood of Whip-poor-wills breeding on Site PI-13N is not great, given the limited amount of suitable habitat available. However there are three on-site reports of this species (Omagh United Taxpayers 1984a) and breeding is suggested (Omagh United Taxpayers 1984b). If breeding is confirmed, the Whip-poor-will should be considered regionally rare.

West Virginia White (Artogeia virginiensis)
In Ontario this butterfly is officially "Endangered" (Ontario Ministry of Natural Resources 1977) and is protected by law (Ontario Government 1971). In Halton R.M. the species is confined to rich deciduous woods above the Niagara Escarpment which support the larval foodplant, Toothwort (Dentaria diphylla). Although West Virginia Whites may wander several miles from Dentaria stands, the butterflies invariably remain in wooded areas (Brownell 1981). It is almost never observed in the open field habitat favoured by its two close relatives, the Mustard White (Artogeia napi) and the European Cabbage Butterfly (A. rapae) (Forbes 1960; Wagner 1978). Despite a great deal of recent investigation into the habits and ecology of this species in Halton R.M., the presence of the West Virginia White has apparently never been confirmed below the Niagara Escarpment (Brownell 1981; Hess 1981; Coulson, pers. comm. 1984).

West Virginia Whites have been reported from the east side of Site PI-13N (Omagh United Taxpayers 1984a, 1984b). Based on the above information this report is probably erroneous. Superficially, West Virginia Whites bear a very close resemblance to the more common Mustard White and butterflies on the wing may easily be misidentified. This problem is compounded by the fact that adults of both species emerge in late April and early May (Voss and Wagner 1956).

Snout Butterfly (*Libytheana bachmanii*)
Outside Point Pelee National Park (Essex County), the Snout Butterfly is of "erratic occurrence" in southern Ontario (Hess 1979). It is generally found only where its larval foodplant, Hackberry (*Celtis occidentalis*) occurs. Since Hackberry grows along the edge of the Niagara Escarpment at Rattlesnake Point (Regional Municipality of Halton, 1978a), approximately 10 km west of Site PI-13N, it is possible that the species may occur in Halton R.M. However, given the Snout Butterfly's very sporadic distribution in Ontario, the Omagh United Taxpayers (1984a, 1984b) report should be viewed with extreme caution. If the presence of Snout Butterfly on Site PI-13N is confirmed, the species should be considered regionally rare.

4.4.3 RARE PLANT SPECIES:

One regionally rare plant species, Buttonbush (*Cephalanthus occidentalis*), is known from Site PI-13N.

Relative population size and distribution pattern of this species on Candidate Site PI-13N were determined from reconnaissance field observations conducted by Gartner Lee Associates Limited (GLAL). Numbers of individuals were noted within field study plots. These totals were supplemented by observations made between sampling stations.

Buttonbush
This shrub is known from a wet thicket area in the north-eastern portion of the site. It forms a dense low lying thicket occupying less than one hectare. Buttonbush is considered rare in the Regional Municipality of Halton (Crins, *pers. comm.* 1984a).

4.5 BIOLOGICAL RESOURCE USE

Biological resource uses considered are: forestry, trapping, hunting and fishing. Resource use has been identified as a biological factor, the rationale for which is provided in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

4.5.1 FORESTRY:

There is little current forestry value or potential on the site. The woodlots are all small, fragmented and of limited forestry use.

The largest of the three woodlots on site is only two hectares in size and composed of upland and lowland deciduous cover. The stand, composed primarily of pole-sized material, has a moderately dense sapling layer.

Of the remaining two woodlots, one is on moderately steep valley walls (southeast corner) and the other is wet and fragmented by thicket and marsh.

Fuelwood cutting for personal consumption and maple syrup extraction are the only forestry related activities reported from the site (Jones, pers. comm. 1984; Marshall, C., pers. comm. 1984).

Within a regional context, forestry is not a significant resource use on Site PI-13N.

4.5.2 TRAPPING:

No trapping is reported on Site PI-13N and is therefore not a significant biological resource use.

4.5.3 HUNTING:

Waterfowl hunting (Jones, pers. comm. 1984) and upland game (rabbits, foxes) hunting (Marshall, C., pers. comm. 1984) have been reported from Site PI-13N. Annual numbers of game species harvested are not known. The ducks and geese hunted on the site likely originate from the adjacent East Sixteen Mile Creek valley.

4.5.4 FISHING:

The only known fishing activity associated with Site PI-13N is a commercial baitfishing operation (McQuigge, pers. comm. 1984). The area involved is that portion of East Sixteen Mile Creek crossed by the Sixth Line. This stream crossing abuts the eastern corner of the site.

McQuigge (pers. comm. 1984) estimates that in 1984 approximately 10,000 fish were taken from this crossing and two others (Fifth Line and Britannia Road). The major species involved were suckers (*Catostomus* spp.), Shiners (*Notropis* spp.) and chubs (*Semotilus* spp.). Although exact numbers of fish harvested at the Sixth Line crossing are not known, baitfishing activity appears to be of minor significance.

4.6 SUMMARY-SITE BIOLOGICAL RESOURCES

Table 2 is a matrix in which factors and indicators are used as headings to present the key findings of research on biological conditions on the site. Some entries in the matrix are numerical, while others are qualitative.

Site biology information, as summarized in Table 2, provides the background data for analysis of constraint, impact prediction, and comparative evaluation, which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 2 Summary Site Biological Resources PI-13N

FACTORS AND INDICATORS

RARE SPECIES			FISH AND WILDLIFE COMMUNITIES				NATURAL VEGETATION COMMUNITIES				BIOLOGICAL RESOURCE USE			
NAME	NO. OF INDIVIDUALS	DISTRIBUTION	SPECIES LIST	AQUATIC HABITAT	TERR.WILD. HABITAT	SPECIAL HABITAT	SPECIES LIST	AREA NAT. VEGETAT.	NO. OF COVER TY.	SPECIAL ASSOC./SEU	FORESTRY	TRAPPING	HUNTING	
• Whip-poor-will	3 reported	- 3 localities around perimeter of site	• 50 bird species • 11 mammal species • 5 reptiles and amphibian species • 1 fish species • 6 butterfly and moth species	• unnamed tributary of East Sixteen Mile Creek	• 5 nat. vegetation cover types • less than 4 ha of forest • very small component of thicket, old field and marsh (<3 ha)	• none reported	•119 plant species	• Upland Deciduous Forest 3 ha • Lowland Deciduous Forest <1 ha • Lowland Shrub Thicket <1 ha • Old Field 1 ha • Marsh <1 ha	• 5 natural cover types • see list to left	small portion of SEU 5-2 (Sixteen Mile Creek Valley) on site (<1 ha)	• fuelwood harvest • some maple syrup extraction	• none reported	• waterfowl and upland game hunted • minor activity	• bait fishing operation immediately adjacent to eastern corner of site
• West Virginia White	1 reported	- east side of site												
• Snout Butterfly	1 reported	- east side of site												
• Buttonbush	more than fifty found	- north corner of site - small wetland												

5.0 EXISTING BIOLOGICAL RESOURCES - SITE VICINITY

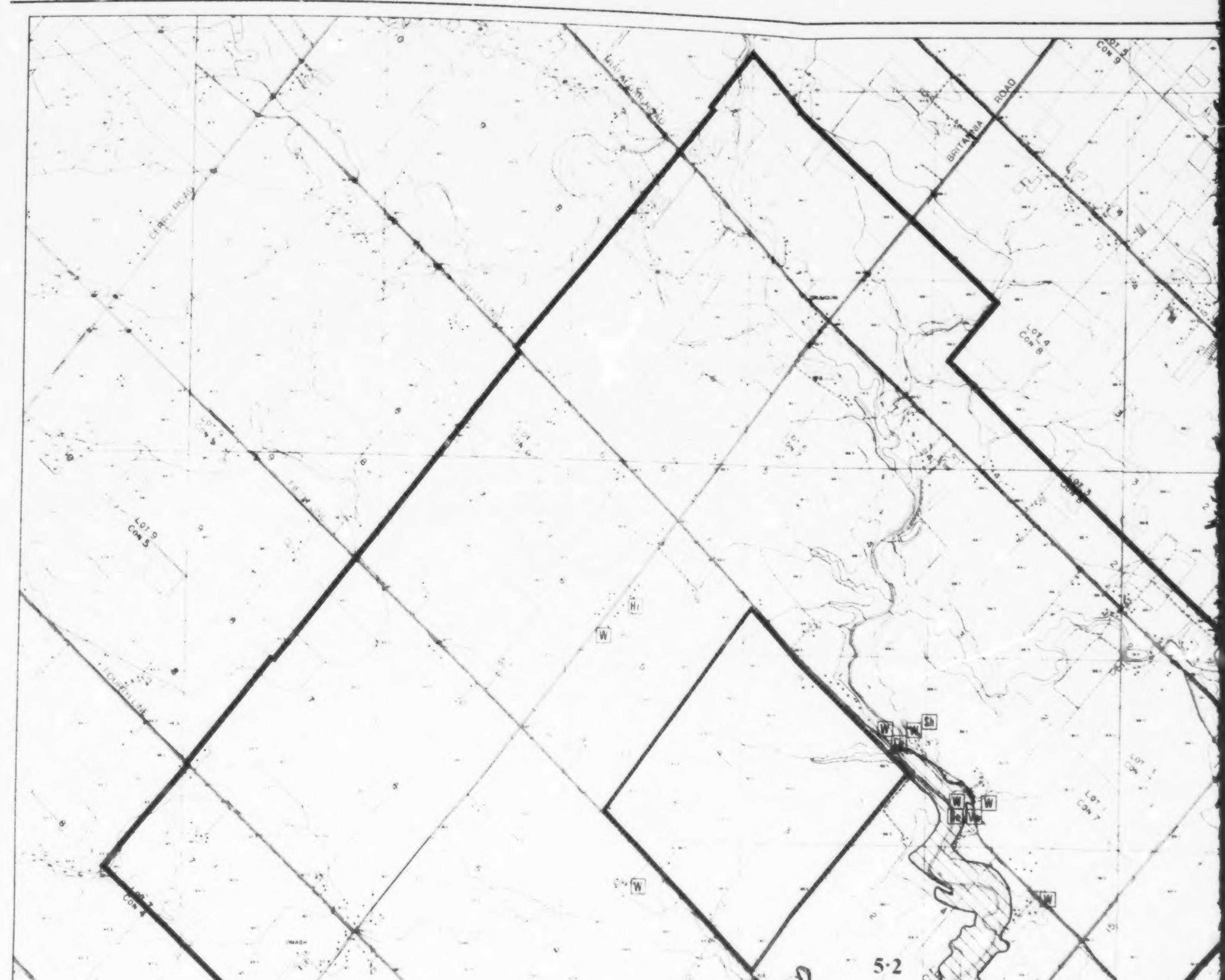
5.1 INTRODUCTION

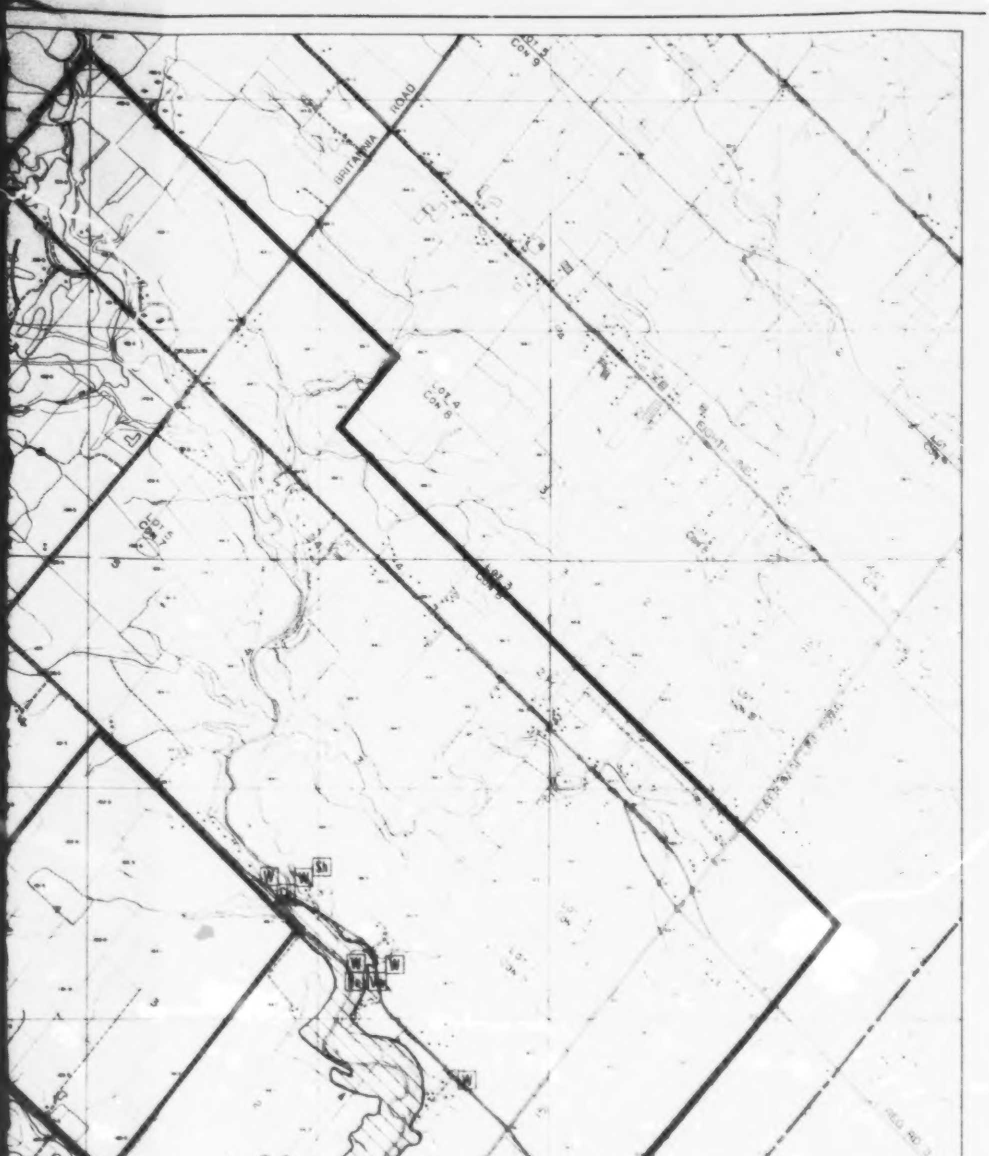
Site vicinity is defined as the area which lies outside Site PI-13N within approximately a 2.0 km radius of the acquisition boundary. The PI-13N site vicinity boundary is delineated in Figure 4 and referred to as "Site Vicinity Study Area Boundary".

A total of 56 plant species has been recorded in the site vicinity (Table 5). Eighty-three of the 127 bird species reported from the site vicinity are permanent or summer residents which possibly breed in the area (Ontario Breeding Bird Atlas 1984; Table 6). An additional 21 species of mammals, 15 species of reptiles and amphibians, 22 species of fish, and nine species of butterflies and moths are reported to occur in the site vicinity (Tables 7 through 10 respectively).

In general, the pattern of vegetation cover types found throughout the site vicinity is similar to that which exist on the site itself.

Biological factors in the site vicinity which were addressed by this study include Significant Environmental Units, fish and wildlife features, natural vegetation associations and rare species.


BRITANNIA ROAD
LOT 4
CON 8
LOT 9
CON 5
LOT 1
CON 7
LOT 16
CON 2N
5·2
W
Sh
Ht
EAST SIXTEEN-MILE CREEK
THIRD LINE
LOT 20
CON 2N
LOT 4
CON 3
LOT 1
CON 4
20
19
22
BOYNE


BRITANNIA ROAD
EIGHTH LINE
5·2
W
Sh
Be
Vw
Vc
Tl
EAST SIXTEEN-MILE CREEK
Lot 20 Con 2N
19
20
21
22
REG. RD. 3

Contour Interval in Metres
1:10 000 base mapping produced by Surveys and Mapping Branch, Ministry of Natural Resources between 1976 and 1984

Ontario Waste Management Corporation

Consultant: Gartner Lee Associates Limited

Legend:

Rare Species Location

ANIMALS		PLANTS	
Hr	Red-shouldered Hawk	Bb	Burning Bush
W	Whip-poor-will	Vc	Virgina Cowslip
Be	Eastern Bluebird	Hs	Harbinger of Spring
Cb	Bobcat	Tl	Twin leaf
Sh	Eastern Hognose Snake		
Vw	West Virginia White		

Significant Environmental Units

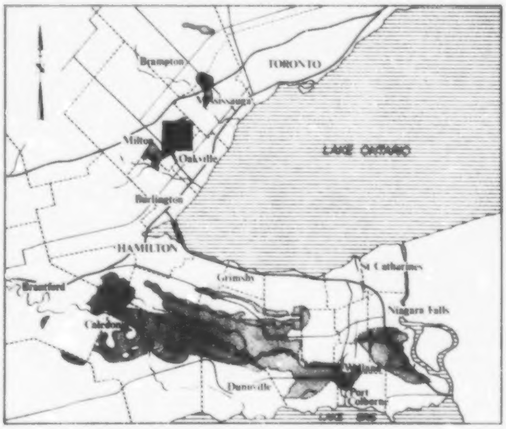
▨ ESAs, ANSIs and AEBRs

13·3 — Unit number
— Candidate area number

Phase 3B Acquisition Boundary
Site Vicinity Study Area Boundary

Key Map: **PI-13 North**

Lots 3 and 4; Concession VI; Town of Milton, formerly the Township of Trafalgar


N
Brampton
TORONTO
Mississauga
Milton
Oakville
LAKE ONTARIO
Burlington
HAMILTON
Grimsby
St Catharines
Brantford
Caledonia
Niagara Falls
Welland
Dunnville
Port Colborne
LAKE ERIE

1000 feet 0 1000
500 metres 0 500

EXISTING BIOLOGICAL CONDITIONS, PHASE 4A

Vegetation and Fish and Wildlife Features in Site Vicinity

September 1985 **FIGURE 4**

5.2 SIGNIFICANT ENVIRONMENTAL UNITS

The term Significant Environmental Units (SEUs) collectively refers to Environmentally Sensitive/Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs) and Areas of Important Biological Resources (AIBRs). The definitions of these units and the rationale for considering them as a biological factor are described in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

SEUs

A portion of one SEU occurs within the PI-13N site vicinity (Figure 4). Areas of the four natural vegetation cover types represented in SEUs are noted in Table 3.

The Sixteen Mile Creek Valley (SEU 5-2) is recognized as an ANSI (OMNR 1983b), as an AIBR (OMNR 1983a) and as an ESA (Regional Municipality of Halton 1978a). This wide, deeply incised river valley occupies the southeastern section of the PI-13N site vicinity. A very small (less than one hectare) portion of the northern end of this SEU enters the site itself. The Sixteen Mile Creek Valley satisfies five of the ESA criteria established by Halton R.M. The valley serves as a major ground water discharge area and important migratory corridor for fish and wildlife, supports high quality deciduous and mixed forests, contains a high diversity of plant and animal species, supports rare plant species, and is large in areal extent.

5.3 FISH AND WILDLIFE FEATURES OF SIGNIFICANCE

None of the fish and wildlife features of Site PI-13N is considered to be of particular significance.

5.4 OTHER NATURAL VEGETATION

This section discusses natural vegetation within that portion of the site vicinity which is not designated as SEU. Six natural vegetation associationsons are represented. The approximate area of each vegetation association is indicated in Table 3. Some appear to have similar structure and composition to those areas studied on Site PI-13N.

Forest

A mix of deciduous, coniferous and mixed forest is present in the site vicinity. The deciduous woods represent the largest component of natural vegetation, occupying approximately 97 hectares.

The bulk of the forest is associated with the East Sixteen Mile Creek and its tributaries.

Eight small blocks of mixed forest are scattered throughout the vicinity, totalling 14 hectares. Five small coniferous pockets (totalling less than one ha) are scattered along the creek valley. It appears that these coniferous woods are native, probably dominated by White Pine (Pinus strobus), Eastern Hemlock (Tsuga canadensis) and Eastern White Cedar (Thuja occidentalis).

TABLE 3: AREAL EXTENT OF NATURAL VEGETATION ASSOCIATIONS IN SITE VICINITY, PI-13N

VEGETATION ASSOCIATION	APPROXIMATE AREA * (ha)
SEU	
Deciduous Forest	52
Coniferous Forest	2
Thicket	<1
Successional Field	9
Other	
Deciduous Forest	97
Mixed Forest	14
Coniferous Forest	<1
Thicket	<1
Successional Field	40
Wetland	2
TOTAL	219

* Areas are approximate and are rounded to whole numbers.

Thicket

Two pockets of thicket (totalling less than one ha) are associated with East Sixteen Mile Creek.

Wetland

Wetlands in the PI-13N site vicinity occupy approximately two hectares. The two pockets of wetland are located along the northern edge of the site vicinity.

Successional Field

Large blocks of successional field are concentrated along East Sixteen Mile Creek and occupy a total of 40 hectares.

Since no field work was conducted in the site vicinity, the significance of site vicinity natural vegetation units as wildlife habitat can only be speculated upon. Most of the woodlots found in the site vicinity are substantially larger in areal extent than those found on the site itself and may harbour a greater diversity of wildlife. Although fragmented, the forested areas in the site vicinity collectively function as travel corridors for wildlife, particularly along East Sixteen Mile Creek and its tributaries.

5.5 RARE SPECIES

Where known, the approximate locations of rare species occurring in the site vicinity are mapped in Figure 4 at an original scale of 1:10,000. The scale of this map has been reduced for reporting purposes. Squares denote rare animals, circles denote rare plants. Each symbol contains a one- or two-letter abbreviation signifying the species' name. Because of their size and the scale of the map base, these symbols are intended to define a general rather than a specific area. They may also denote multiple occurrences of a rare plant species, where, for example, several individuals are found in close proximity to one another. For information concerning actual numbers of individuals of rare species and their site vicinity distribution, the reader is referred to the accompanying text of Section 5.5.

5.5.1 RARE ANIMAL SPECIES:

Three rare birds, one rare mammal, one rare reptile, and one rare butterfly have been reported in the PI-13N site vicinity.

Red-shouldered Hawk (*Buteo lineatus*)

Since the early 1960's, the Red-shouldered Hawk population in the Central Region of Ontario (including Halton R.M.) has experienced "a drastic decline" (Risley 1982). According to preliminary results of the Ontario Breeding Bird Atlas Project (Ontario Breeding Bird Atlas 1984), this species is listed as a "possible" breeder in the 10 km square unit (square 17-NV-91) which encompasses the PI-13N site vicinity. A report released by the Omagh United Taxpayers (1984b) suggests that this buteo nests in the site vicinity; however concrete evidence is lacking. In the event that nesting by Red-shouldered Hawks is confirmed in the vicinity of Site PI-13N, this species should be considered rare on a regional level. For nesting purposes, Red-shouldered Hawks prefer large tracts of moist riparian woodland (Risley 1982) such as the East Sixteen Mile Creek Valley.

Whip-poor-will

Whip-poor-wills have been reported from ten locations within the site vicinity (Omagh United Taxpayers 1984a; Austin, *pers. comm.* 1984). For the regional status of this species the reader is referred to Section 4.4.2 of this technical appendix.

Eastern Bluebird (*Sialia sialis*)

Bluebirds have been reported from the East Sixteen Mile Creek valley approximately 200 m east of Site PI-13N (Omagh United Taxpayers 1984a; Sweetman, *pers. comm.* 1984). Although listed as a breeding species (Omagh United Taxpayers 1984b), concrete evidence of breeding on the PI-13N site vicinity is presently lacking.

Throughout much of its range, the Eastern Bluebird has experienced a pronounced population decline in recent years (Tate and Tate 1982). The species was recently added to the list of rare Canadian taxa by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Muir 1984).

As of 1983, no breeding evidence for the Eastern Bluebird was recorded in any of the 10 km square units containing or adjacent to Site PI-13N (Ontario Breeding Bird Atlas 1984). If future breeding is confirmed on Site PI-13N, this species should be considered regionally rare.

Bobcat (*Lynx rufus*)

According to an area resident (Jaap, *pers. comm.* 1984), Bobcats used to occur in the vicinity of Site PI-13N but have since "disappeared". As the Bobcat is a shy species and thus seldom seen, it is possible that it still occurs in some areas of Halton R.M. The species is able to adapt to changing environments, a characteristic that has led to its occupancy of agricultural lands.

According to Banfield (1974) there is evidence to suggest that Bobcats have recently entered Ontario from the south and continue to extend their range northward. If the presence of Bobcat in the PI-13N site vicintiy is confirmed, this species should be considered regionally rare.

Eastern Hognose Snake (*Heterodon platyrhinos*)
A report of this species from the eastern perimeter of Site PI-13N (Omagh United Taxpayers 1984a) is intriguing but as yet unsubstantiated. There are no localities in Halton R.M. where this rare snake is known to occur (Logier and Toner 1961). The report from East Sixteen Mile Creek should be viewed with caution until such time as further evidence is forthcoming.

West Virginia White
There is an unconfirmed report of this provincially "Endangered" species from East Sixteen Mile Creek (Omagh United Taxpayers 1984a). For the provincial and regional status of this butterfly the reader is referred to Section 4.4.2 of this technical appendix.

5.5.2 RARE PLANT SPECIES:

Six rare plant species have been reported from the PI-13N site vicinity, all associated with the East Sixteen Mile Creek Valley.

Four are considered rare in Ontario and Canada, the first three by Argus and White (1977) and the fourth by Argus and Keddy (undated). These are:

Virginia Cowslip	Mertensia virginica
Harbinger of Spring	Erigenia bulbosa
Twin-leaf	Jeffersonia diphylla
Burning Bush	Euonymus atropurpureus

All but Virginia Cowslip are also considered to be rare in the Regional Municipality of Halton (Crins, *pers. comm.* 1984b).

The two remaining species are neither provincially nor nationally rare, but are considered rare in Halton Region (Crins, *pers. comm.* 1984b). These are:

False Foxglove	Aureolaria flava
Chinquapin Oak	Quercus muhlenbergii

Virginia Cowslip, Harbinger of Spring, Twin-leaf, Burning Bush

All four species are known from the Sixteen Valley Conservation Area, situated south of the candidate site. The first three were reported by Ball and Maycock (*pers. comm.* 1984), while Burning Bush was reported by the Halton Region Conservation Authority (1984). An exact location is known for Burning Bush (Figure 4); locations given for the other three are approximate.

Virginia Cowslip, characteristic of rich woods and river bottoms, has also been reported from the Sixteen Mile Creek Valley ESA by the Regional Municipality of Halton (1978a) and from the East Sixteen Mile Creek Valley by the Omagh United Taxpayers (1984b).

Twin-leaf has also been reported from the Sixteen Mile Creek Valley ESA (Regional Municipality of Halton 1978a) and the East Sixteen Mile Creek Valley (Omagh United Taxpayers 1984b).

False Foxglove, Chinquapin Oak

There is some doubt as to whether these two species occur in the site vicinity.

False Foxglove is reported from the area (Omagh United Taxpayers 1984b), however an exact location is not given. The station likely corresponds with one on the main branch of the East Sixteen Mile Creek south of Lower Baseline Road (Regional Municipality of Halton 1979). This station is approximately 1.5 km outside the vicinity to the southwest.

Chinquapin Oak has been reported from the Sixteen Mile Creek Valley ESA (Regional Municipality of Halton 1978a) and from the East Sixteen Mile Creek Valley (Omagh United Taxpayers 1984b). Although the exact locations of these records are unknown, they likely refer to a station on the main branch of East Sixteen Mile Creek south of Highway 5 (Regional Municipality of Halton 1980) which is situated approximately 4 km ouside the vicinity.

5.6 SUMMARY - SITE VICINITY BIOLOGICAL RESOURCES

Table 4 is a matrix in which factors and indicators are used to organize key findings of research on biological conditions in the site vicinity.

Site vicinity biology information as summarized in Table 4, provides the background data for analysis of constraint, impact prediction, and comparative analysis which are addressed in "Site Selection Process Phase 4A: Selection of a Preferred Site(s) - Biology".

Table 4 Summary Site Vicinity Biological Resources PI-13 N

FACTORS AND INDICATORS

SIGNIFICANT ENVIRONMENTAL UNITS		FISH & WILDLIFE FEATURES OF SIGNIFICANCE		OTHER NATURAL VEGETATION	RARE SPECIES
SEU	DISTANCE TO SITE	FEATURE	DISTANCE TO SITE		
5-2 ● Sixteen Mile Creek Valley ● Halton R.M. ESA Study; ANSI, AIBR (OMNR)	- directly adjacent to eastern corner			● Deciduous Forest 97 ha ● Coniferous Forest <1 ha ● Mixed Forest 14 ha ● Thicket <1 ha ● Successional Field 40 ha ● Wetland 2 ha	ANIMALS ● Red-shouldered Hawk ● Whip-poor-will ● Eastern Bluebird ● Bobcat ● Eastern Hognose Snake ● West Virginia White PLANTS ● Twin-leaf ● Virginia Cowslip ● Chinquapin Oak ● Burning Bush ● Harbinger of Spring ● False Foxglove

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7.0 SPECIES LIST

Nomenclature and taxonomic arrangement of the plant species contained in Table 5 are based on a variety of recognized literature sources. In general the list follows the sequence of Gleason (1952). For specific groups of flora the following references were consulted: bryophytes (Ireland and Cain 1975), grasses (Dore and McNeill 1980), trees (Hosie 1979) and shrubs (Soper and Heimburger 1982).

Common and scientific names and taxonomic arrangement of faunal species (Tables 6 through 10) are in accordance with the following sources: birds (American Ornithologists' Union 1983), mammals (Banfield 1974), amphibians and reptiles (Collins et al. 1982), fish (Scott and Crossman 1973), and butterflies (Miller and Brown 1981).

These species lists indicate both common and scientific (Latin) names. The occurrence of a species is denoted by a source number(s) under either or both location headings.

Sources are described briefly (author and year) in a legend which follows Table 10. Full citations for authors noted in this legend can be found in Section 6.0. Species occurrences confirmed by Gartner Lee field work are underlined; these are sources 11, 13 and 38.

7.1 FLORAL AND FAUNAL RARITY

Vascular Plant Species

Definitions of botanical rarity were derived from a number of sources. These include published reports, discussions with knowledgeable individuals and professional judgement. Status on national, provincial and regional levels was examined.

On a national level, 19 plant species are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Rare", "Threatened" or "Endangered". An additional species is listed by COSEWIC for which no status is assigned (COSEWIC 1984).

The Rare Vascular Plants of Ontario (Argus and White 1977) designates provincially and nationally rare plants. Since the publication of this Syllogeus by the National Museum of Natural Sciences in Ottawa, revisions and updates on the status of particular plant families have been dispensed (Argus and White 1982, 1983; Argus and Keddy, undated).

For vascular plant species not yet reviewed by the Atlas of Rare Vascular Plants of Ontario Program, working files in Ottawa were accessed and discussions were held with appropriate experts.

Two plant species are protected under the Endangered Species Act in Ontario (OMNR 1977).

A regional perspective was obtained from several sources.

An Environmentally Sensitive Areas (ESA) study for Halton Region conducted in 1978 (Regional Municipality of Halton 1978a), addresses the rare plant species in the region. Subsequent works by the Regional Municipality of Halton (1979, 1980c), produced in conjunction with the Royal Botanical Gardens, provide updated species lists for designated ESAs in Halton Region and some discussion of rarity.

The Halton Region Conservation Authority (1979) produced a report entitled A Biological Inventory of Halton Region Conservation Authority Properties which contains a discussion of rare flora.

Sutherland (1981) has compiled A Provisional List of the Rare Vascular Plants of the Regional Municipality of Halton. This document was referred to for background information on plant status and distribution.

The most current source of information concerning plant status and distribution in Halton Region is a working file maintained by W.J. Crins at the Erindale Herbarium (University of Toronto). The file contains data concerning all plant collections made in the region to date. It is thought to accurately represent the regional status of plants (Crins, pers. comm. 1984a). Rare species are those for which there are five stations or fewer in Halton Region.

Material referred to for status information outside, but adjacent to, the Regional Municipality of Halton included The Vascular Plant Flora of Peel County (Webber 1984) and the ESA study prepared for the Regional Municipality of Hamilton-Wentworth (Ecologistics Ltd. 1976).

Bird Species

Definitions of rarity for bird species were derived from a variety of sources. Rare status on a national level is designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of April 1984, COSEWIC listed 21 species of birds which are "Endangered", "Threatened" or "Rare" in Canada. An additional six problematic species, whose exact statuses are still unclear, are included under the heading "Not In Any Category". Reference has been made to COSEWIC status reorts where applicable.

Frequency and realtive abundance standards are assigned to Ontario birds by James *et al*. (1976). The classification system employed in this document is a simplified version of the system developed by Arbib (1957).

Additional documentation of rare breeding bird species in Ontario is provided by Eagles and McCauley (1982), who divide types of rarity into nine subclassifications.

Reference to the work of Baillie and Harrington (1936, 1937), Snyder (1957) and deVos (1964b) allows for a comparison of recent and historical abundance and distribution patterns. Collectively, these sources document significant status changes which have occurred in this century.

Seven species of birds have been officially listed as "Endangered" in the Province of Ontario (OMNR 1977) and are accorded legal protection under the Endangered Species Act (Ontario Government 1971).

Status reports on a number of rare and endangered bird species have been prepared as draft documents for the Ontario Ministry of Natural Resources. These reports have been consulted to assess the particular status of a species in the province from both an historical and present-day perspective.

Regional rarity has been determined largely on the basis of published information (if such is available), supplemented by unpublished observations and the testimony of knowledgeable individuals familiar with the birdlife of a particular area.

The only published account of the birds of Halton Region is provided by Brooks (1906). This cursory treatment is now badly outdated. Subsequent investigations have apparently not been carried out on a regional level.

In the absence of any recent published data, the statuses which have been applied to various birds in Halton R.M. largely reflect the opinions of local experts and are thus purely subjective. References to "Significant" Halton species are contained in several recent reports (Regional Municipality of Halton 1978a; Halton Region Conservation Authority 1979).

More recent information on the status of breeding birds in Halton Region was largely gleaned from discussions with local experts. Preliminary (1981-83) data compiled by the Ontario Breeding Bird Atlas Project were also consulted extensively.

Mammal Species

As of April 1984, 20 species of mammals are designated as "Endangered", "Threatened" or "Rare" in Canada by COSEWIC. An additional five species of concern are included on the COSEWIC list but have not as yet been assigned to any of the above categories. COSEWIC status reports provide not only a national perspective of a particular species' status, but often a provincial and regional overview as well.

Banfield (1974) deals with the status of Canadian mammals but does not provide definitions for the various terms used.

Provincial status is not addressed in Dagg's (1974) account of Ontario mammals. Although somewhat outdated, R.L. Peterson's The Mammals of Eastern Canada (1966) is still considered to be the authoritative treatise on the subject.

DeVos (1964a) documents changes in the distribution and abundance of various Ontario mammals dating back to the last century. A series of recent status reports prepared for the Ontario Ministry of Natural Resources review the historical and present day status of rare species.

There are no known published accounts of the mammalian fauna of the Regional Municipality of Halton. Information supplied by local naturalists and recognized authorities in the field of mammalogy was largely relied upon to determine the regional status of particular species. Campbell and Dagg's (1972) account of the mammalian fauna of Waterloo and

South Wellington Counties was also consulted, as this area is considered to be fairly representative of southern Ontario as a whole.

Reptiles and Amphibians

Cook (1976) reviewed the status of the Canadian herpetofauna and identified 23 "Endangered" and "Threatened" species. To date however, only one species has been officially recognized as "Endangered" by COSEWIC (1984).

Provincially rare reptiles and amphibians have been identified in a series of Ontario Ministry of Natural Resources status reports. Three of these species are considered "Endangered" in Ontario (OMNR 1977).

Regional rarity is more difficult to assess due to a shortage of published information concerning the herpetofauna of specific southern Ontario localities. Logier and Toner (1961) list known specimen localities from what was formerly Halton County; however, they do not assign status. A survey of the amphibians and reptiles of the Niagara Escarpment Planning Area (Campbell 1976) also includes references to Halton. The significance of several Halton herptiles is briefly addressed by the Halton Region Conservation Authority (1979).

Fish

Status reviews of "Endangered", "Threatened" and "Rare" fish in Canada and southern Ontario have recently been published by McAllister *et al*. (1985) and Beak Consultants Limited (1980), respectively. At present, COSEWIC status reports are available for 11 fish species.

Butterflies

One butterfly species is presently protected in Ontario by "Endangered" species legislation. The population status of rare Ontario butterflies are periodically reviewed in various entomological and natural history journals.

Limitations

A disproportionate amount of the wildlife information reviewed during this phase of the study dealt with birds. For this group, quantitive definitions of rarity could be proposed with a considerable degree of confidence. However, since fewer data concerning other faunal groups were available, rarity is defined in a more subjective fashion.

Much of the available published information is dated and thus does not necessarily reflect existing conditions. In some cases current information does exist but in unprocessed form or as draft manuscripts. It is often difficult to gain immediate access to these data.

Professional judgement often had to be applied when assessing the accuracy and reliability of the data compiled. In the absence of much published information, decisions concerning the regional status of rare species were made largely on the basis of the expertise provided by local naturalists. For many of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

A considerable amount of time and effort was expended in gathering unpublished information concerning the present

status and distribution of problematic species. Botanists at Erindale College (University of Toronto), University of Guelph, and the National Museum of Natural Sciences in Ottawa, were consulted on a number of occasions.

In cases where wildlife data were lacking, lengthy discussions were held with appropriate government agency personnel and Regional Co-ordinators and birdwatchers participating in the Ontario Breeding Bird Atlas Project.

For some of the rare species reported to us by others, pertinent details of the observation are lacking. Pending further corroborating evidence, the authenticity of these reports must be questioned.

TABLE 5: CHECKLIST OF PLANT SPECIES RECORDED ON CANDIDATE SITE PI-13N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LYCOPODIACEAE	CLUBMOSS FAMILY		
Lycopodium obscurum L.	Ground-pine	11	
EQUISETACEAE	HORSETAIL FAMILY		
Equisetum arvense L.	Field Horsetail	11	
E. hyemale L.	Common Scouring-rush	11	
ASPLENIACEAE	SPLEENWORT FAMILY		
Onoclea sensibilis L.	Sensitive Fern	11	
Dryopteris marginalis A. Gray	Evergreen Wood-fern		20
THELYPTERIDACEAE	BEECH FERN FAMILY		
Thelypteris palustris (Salisb.) Schott	Marsh Fern	11	
PINACEAE	PINE FAMILY		
Pinus strobus L.	White Pine		15
Tsuga canadensis (L.) Carr.	Eastern Hemlock		15,1, 2,16

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
CUPRESSACEAE	CYPRESS FAMILY		
Thuja occidentalis L.	Eastern White Cedar		16,2,19
TYPHACEAE	CATTAIL FAMILY		
Typha angustifolia L.	Narrow-leaved Cattail	11	
T. latifolia L.	Cattail	11	
ZOSTERACEAE	PONDWEED FAMILY		
Potamogeton nodosus Poir	Knotty Pondweed		20
ALISMATACEAE	WATER-PLANTAIN FAMILY		
Alisma plantago-aquatica L.	Water-plantain	11	
Sagittaria latifolia Willd.	Arrowhead		20,38
POACEAE	GRASS FAMILY		
Glyceria striata (Lam.) A.S. Hitchc.	Fowl Manna Grass	11	
Dactylis glomerata L.	Orchard Grass	40	
Elymus hystrix L.	Bottle-brush Grass	11	
E. virginicus L.	Virginia Wild-rye	11	
Agrostis hyemalis (Walt.) B.S.P.	Hair-grass	11	
A. stolonifera L.	Creeping Bent Grass	11	
Phleum pratense L.	Timothy	40	
Phalaris arundinacea L.	Reed Canary Grass	11	
Leersia oryzoides (L.) Sw.	Rice Cut Grass	11	
Panicum capillare L.	Witch Grass	11	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
CYPERACEAE	SEDGE FAMILY		
Scirpus cyperinus (L.) Kunth.	Wool-grass	11	
S. validus Vahl.	Common Great Bulrush		20
Eleocharis obtusa (Willd.) Schult.	Blunt Spike-rush	11	
Carex crinita Lam.	Sedge	11	
C. cristatella Britt.	Sedge	11	
C. gracillima Schw.	Sedge	11	
C. intumescens Rudge	Sedge	11	
C. lacustris Willd.	Sedge	11	
C. lupulina Muhl. ex Willd.	Sedge	11	
C. rosea Schk.	Sedge	11	
C. tribuloides Wahl.	Sedge	11	
C. vulpinoidea Michx.	Sedge	11	
ARACEAE	ARUM FAMILY		
Arisaema triphyllum (L.) Torr.	Jack-in-the-pulpit	11	
LEMNACEAE	DUCKWEED FAMILY		
Lemna minor L.	Common Duckweed	11	
L. trisulca L.	Star Duckweed	11	
JUNCACEAE	RUSH FAMILY		
Juncus effusus L.	Soft Rush	11	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
LILIACEAE	LILY FAMILY		
Uvularia sessilifolia L.	Sessile-leaved Bellwort	11	
Allium canadense L.	Meadow Garlic		20
A. schoenoprasum L.	Chives		20
A. tricoccum Ait.	Wild Leek	11	7,5
Lilium canadense var. *michiganense* Farw.	Michigan Lily		38
Erythronium albidum Nutt.	White Trout Lily		19,2,20
E. americanum Ker.	Yellow Trout Lily		20
Smilacena racemosa (L.) Desf.	False Solomon's-seal	11	
Maianthemum canadense Desf.	Wild Lily-of-the-valley	11	
Smilax tamnoides L. var. *hispida* (Muhl.) Fern	Bristly Catbrier	11	
IRIDACEAE	IRIS FAMILY		
Iris versicolor L.	Wild Blue Flag		7
ORCHIDACEAE	ORCHID FAMILY		
Epipactis helleborine (L.) Crantz.	Helleborine	11	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
SALICACEAE	WILLOW FAMILY		
Populus balsamifera L.	Balsam Poplar	11	
P. tremuloides Michx.	Trembling Aspen	38,11	
Salix amygdaloides Anderss.	Peach-leaved Willow	11	
S. eriocephala Michx.	Willow	11	
S. nigra Marsh.	Black Willow	11	
S. pentandra L.	Bay-leaved Willow		20
S. purpurea L.	Purple Osier Willow		20
JUGLANDACEAE	WALNUT FAMILY		
Juglans cinerea L.	Butternut	11	
Carya cordiformis (Wang.) K. Koch	Bitternut Hickory		2
C. ovata (Mill.) K. Koch	Shagbark Hickory	38,11, 3	20
BETULACEAE	BIRCH FAMILY		
Carpinus caroliniana Walt.	Blue Beech	11	
Ostrya virginiana (Mill.) K. Koch	Hop Hornbeam	11	15
Betula papyrifera Marsh. 15	Paper Birch		

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
FAGACEAE	BEECH FAMILY		
Fagus grandifolia Ehrh.	American Beech	11,15	20,15
Quercus alba L.	White Oak	38,11	15
Q. macrocarpa Michx.	Bur Oak	38,11	
Q. muhlenbergii Engelm.*	Chinquapin Oak		19
Q. rubra L.	Red Oak	11,15	15
ULMACEAE	ELM FAMILY		
Ulmus americana L.	American Elm	11	20
URTICACEAE	NETTLE FAMILY		
Laportea canadensis (L.) Wedd.	Wood Nettle	11	
POLYGONACEAE	BUCKWHEAT FAMILY		
Rumex crispus L.	Curled Dock	11	
Polygonum persicaria L.	Lady's Thumb	11	
CHENOPODIACEAE	SPINACH FAMILY		
Chenopodium album L.	Lamb's-quarters	11	
AMARANTHACEAE	AMARANTH FAMILY		
Amaranthus retroflexus L.	Redroot Pigweed	11	
PORTULACACEAE	PURSLANE FAMILY		
Claytonia virginica L.	Spring Beauty		20

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
RANUNCULACEAE	BUTTERCUP FAMILY		
Actaea rubra (Ait.) Willd.	Red Baneberry		20
Hepatica acutiloba DC.	Sharp-lobed Hepatica	11	
Thalictrum dioicum L.	Early Meadow Rue	11	
BERBERIDACEAE	BARBERRY FAMILY		
Jeffersonia diphylla L.*	Twin-leaf		2,19, 21
MENISPERMACEAE	MOONSEED FAMILY		
Menispermum canadense L.	Moonseed Vine		2,19
LAURACEAE	LAUREL FAMILY		
Sassafras albidum (Nutt.) Nees	Sassafras		2,19
BRASSICACEAE	MUSTARD FAMILY		
Dentaria diphylla Michx.	Toothwort		20
D. laciniata Muhl.	Cut-leaved Toothwort		20
GROSSULARIACEAE	GOOSEBERRY FAMILY		
Ribes cynosbati L.	Pasture Gooseberry	11	20
R. odoratum Wendl.fil.	Golden Currant		20
HAMAMELIDACEAE	WITCH-HAZEL FAMILY		
Hamamelis virginiana L.	Witch-hazel		20
PLATANACEAE	PLANE-TREE FAMILY		
Platanus occidentalis L.	Sycamore		2

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ROSACEAE	ROSE FAMILY		
Spirea alba Du Roi	Narrow-leaved Meadowsweet	11	
Malus domestica Borkh.	Apple	11	
Crataegus scabrida	Hawthorn	11	
Rubus idaeus L. var. *strigosus* (Michx.) Maxim.	Wild Red Raspberry	11	
R. odoratus L.	Purple-flowering Raspberry		20
R. pubescens Raf.	Dwarf Raspberry	11	
Fragaria virginiana Dene.	Strawberry	11	
Potentilla norvegica L.	Rough Cinquefoil	11	
Geum allepicum Jacq. var. *strictum* (Ait.) Fern.	Yellow Avens	11	
Prunus virginiana L.	Choke Cherry	11	
FABACEAE	PEA FAMILY		
Medicago sativa L.	Alfalfa	11	
Trifolium pratense L.	Red Clover	11	
Vicia cracca L.	Cow Vetch	11	
GERANIACEAE	GERANIUM FAMILY		
Geranium maculatum L.	Wild Geranium	11	
G. robertianum L.	Herb-robert	11	
EUPHORBIACEAE	SPURGE FAMILY		
Euphorbia cyparissias L.	Cypress Spurge		20
ANACARDIACEAE	CASHEW FAMILY		
Rhus radicans L.	Poison Ivy	11	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	 VICINITY
CELASTRACEAE	STAFF-TREE FAMILY		
Euonymus atropurpureus Jacq. *	Burning Bush		20
E. obovatus Nutt.	Running Strawberry Bush	11	
ACERACEAE	MAPLE FAMILY		
Acer nigrum Michx.f.	Black Maple		2,7,19
A. rubrum L.	Red Maple	11	
A. saccharinum L.	Silver Maple	38,11, 3	
A. saccharum Marsh.	Sugar Maple	11	17,5,7
BALSAMINACEAE	JEWEL-WEED FAMILY		
Impatiens biflora Walt.	Spotted Jewelweed	11	
VITACEAE	GRAPE FAMILY		
Parthenocissus vitacea (Knerr.) Hitchc.	Virginia Creeper	11	
TILIACEAE	LINDEN FAMILY		
Tilia americana L.	Basswood	11	15
VIOLACEAE	VIOLET FAMILY		
Viola papilionacea Pursh.	Stemless Blue Violet		20
LYTHRACEAE	LOOSESTRIFE FAMILY		
Lythrum salicaria L.	Purple Loosestrife		38

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ELAEGNACEAE	OLEASTER FAMILY		
Shepherdia canadensis (L.) Nutt.	Buffalo Berry		2,20
ONAGRACEAE	EVENING-PRIMROSE FAMILY		
Oenothera biennis L.	Hairy Yellow Evening-primrose	11	
Circaea quadrisulcata (Maxim.) Franch. & Sav.	Enchanter's Nightshade	11	
ADIACEAE	CARROT FAMILY		
Sanicula marlandica L.	Black Snakeroot	11	
Erigenia bulbosa (Michx.) Nutt.*	Harbinger of Spring		21
Cicuta maculata L.	Spotted Water-hemlock	11	
Daucus carota L.	Wild Carrot	11	
CORNACEAE	DOGWOOD FAMILY		
Cornus racemosa Lam.	Gray Dogwood	11	
C. rugosa Lam.	Round-leaved Dogwood		20
ERICACEAE	HEATH FAMILY		
Vaccinium pallidum Ait.	Low Sweet Blueberry		2
PRIMULACEAE	PRIMROSE FAMILY		
Lysimachia ciliata L.	Fringed Loosestrife	11	

TABLE 5 (cont'd)

LATIN NAME	COMMON NAME	OCCURRENCE AND SOURCES SITE	VICINITY
OLEACEAE	OLIVE FAMILY		
Fraxinus americana L.	White Ash	11,15	15,20
F. nigra Marsh.	Black Ash	11	
F. pennsylvanica Marsh.	Red Ash	11	
HYDROPHYLLACEAE	WATERLEAF FAMILY		
Hydrophyllum virginianum L.	Virginia Waterleaf	11	
BORAGINACEAE	BORAGE FAMILY		
Mertensia virginica (L.) DC. *	Virginia Cowslip		2,19,21
Myosotis laxa Lehm.	Forget-me-not	11	
VERBENIACEAE	VERVAIN FAMILY		
Verbena hastata L.	Blue Vervain	11	
LAMIACEAE	MINT FAMILY		
Prunella vulgaris L.	Heal-all	11	
Leonurus cardiaca L.	Motherwort	11	
Lycopus americanus Muhl.	American Water-horehound	11	
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum dulcamara L.	Climbing Nightshade	11	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
SCROPHULARIACEAE	FIGWORT FAMILY		
Aureolaria flava (L.) Farw. *	False Foxglove		2
RUBIACEAE	MADDER FAMILY		
Cephalanthus occidentalis L. *	Buttonbush	24,38, 11,16	
Galium circaezans Michx.	Wild Licorice		20
G. palustre L.	Marsh Bedstraw		20
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Viburnum rafinesquianum Schult.	Downy Arrow-wood		20
Symphocarpius albus (L.) Blake	Snowberry		20
Lonicera dioica L.	Glaucous Honeysuckle	11	
Diervilla lonicera Mill.	Bush Honeysuckle		20
DIPSACACEAE	TEASEL FAMILY		
Dipsacus fullonum L.	Teasel	11	
CUCURBITACEAE	GOURD FAMILY		
Echinocystis lobata (Michx.) T. & G.	Wild Cucumber	11	

TABLE 5 (cont'd)

		OCCURRENCE AND SOURCES	
LATIN NAME	COMMON NAME	SITE	VICINITY
ASTERACEAE	ASTER FAMILY		
Solidago canadensis L.	Canada Goldenrod	11	
S. flexicaulis L.	Zig-zag Goldenrod	11	
Aster cordifolius L.	Heart-leaved Aster	11	
A. macrophyllus L.	Large-leaved Aster	11	
A. novae-angliae L.	New England Aster	11	
A. simplex Willd.	Panicled Aster	11	
Inula helenium L.	Elecampane	11	
Bidens cernua L.	Nodding Beggar-ticks	11	
B. connata Muhl.	Devil's Beggar-ticks	11	
Arctium minus (Hill.) Bernh.	Common Burdock	11	
Sonchus arvensis L.	Perrenial Sow-thistle	11	
Lactuca canadensis L.	Canada Lettuce	11	
BRYOPHYTES			
MNIACEAE			
Plagiomnium cuspidatum (Hedw.) Kop.		11	
AMBLYSTEGIACEAE			
Campylium stellatum (Hedw.) C. Jens.		11	
Drepanocladus vernicosus (Lindb. ex C. Hartm.) Warnst.		11	

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* Denotes that the species is considered to be rare based upon recognized literature sources (See Section 4.4 and 5.5)

TABLE 6: CHECKLIST OF BIRD SPECIES RECORDED ON CANDIDATE SITE PI-13N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
American Bittern	*Botaurus lentiginosus*		1,2,16
Great Blue Heron	*Ardea herodias*	1,2, 11,27	1,2,5,8, 12,14,16, 25,34,32, 38
Green-backed Heron	*Butorides striatus*		2,12,16, 38
Black-crowned Night-Heron	*Nycticorax nycticorax*		1,2
Canada Goose	*Branta canadensis*	1,2, 11,22, 26,27, 39	1,2,4,6,8, 12,14,21, 24,25,31
Wood Duck	*Aix sponsa*		1,2
Green-winged Teal	*Anas crecca*		1,2
American Black Duck	*Anas rubripes*		2
Mallard	*Anas platyrhynchos*	1,2,3, 11,26, 39	1,2,8,3, 12,21,38
Lesser Scaup	*Aythya affinis*		1,2
White-winged Scoter	*Melanitta fusca*		2
Common Merganser	*Mergus merganser*		1,2
Red-breasted Merganser	*Mergus serrator*		1,2
Ruddy Duck	*Oxyura jamaicensis*		1,2
Turkey Vulture	*Cathartes aura*	1,2,11, 38,39	1,2,4,6, 12
Northern Harrier	*Circus cyaneus*		1,2,4
Northern Goshawk	*Accipiter gentilis*		1,2
Red-shouldered Hawk	*Buteo lineatus* *		1,2,4
Red-tailed Hawk	*Buteo jamaicensis*	11,13, 38	1,2,12, 14
Rough-legged Hawk	*Buteo lagopus*		1
American Kestrel	*Falco sparverius*	1,2,11, 38	1,2,4, 12
Ring-necked Pheasant	*Phasianus colchicus*		1,2,14
Ruffed Grouse	*Bonasa umbellus*	1,2	1,2,8, 28

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Northern Bobwhite	Colinus virginianus		1
Killdeer	Charadrius vociferus	1,2,11,38	1,2,4,8,12,25,31
Lesser Yellowlegs	Tringa flavipes		12,38
Spotted Sandpiper	Actitis macularia		4,12
Upland Sandpiper	Bartramia longicauda	1,2	1,2,4
Common Snipe	Gallinago gallinago		1,2
American Woodcock	Scolopax minor		1,2,4
Herring Gull	Larus argentatus	11,38	
Rock Dove	Columba livia		4,14
Mourning Dove	Zenaida macroura	1,2,11	1,2,4,8,12,38
Yellow-billed Cuckoo	Coccyzus americanus		4
Common Barn-Owl	Tyto alba		1,2
Eastern Screech-Owl	Otus asio	1,2	1,2,6,8,14,19
Great Horned Owl	Bubo virginianus	1,2	1,2,4,19
Snowy Owl	Nyctea scandiaca	1,2	1,2,6,8
Barred Owl	Strix varia		1,2
Common Nighthawk	Chordeiles minor		1,4
Whip-poor-will	Caprimulgus vociferus *	1,2	1,2,6
Ruby-throated Hummingbird	Archilochus colubris		1,2,4,8,38
Belted Kingfisher	Ceryle alcyon	11,27,38	1,2,4,10,12
Red-headed Woodpecker	Melanerpes erythrocephalus	1,2	1,2,4
Red-bellied Woodpecker	Melanerpes carolinus		8
Yellow-bellied Sapsucker	Sphyrapicus varius	11,38	
Downy Woodpecker	Picoides pubescens		1,2,8
Hairy Woodpecker	Picoides villosus		1,2
Northern Flicker	Colaptes auratus	11,38	1,2,6,8,12
Pileated Woodpecker	Dryocopus pileatus	11,38	1,2,4,8,10,28
Eastern Wood-Pewee	Contopus virens		1,2,4
Acadian Flycatcher	Empidonax virescens		1,2

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Willow Flycatcher	*Empidonax traillii*		4,12
Eastern Phoebe	*Sayornis phoebe*		1,2,4
Great Crested Flycatcher	*Myiarchus crinitus*		1,2,4
Eastern Kingbird	*Tyrannus tyrannus*		1,2,4,
Eurasian Skylark	*Alauda arvensis*		1
Horned Lark	*Eremophila alpestris*		1,2,4
Purple Martin	*Progne subis*		1,2,8 12
Tree Swallow	*Tachycineta bicolor*	1,2	1,2,4, 9
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		4
Bank Swallow	*Riparia riparia*		12,38
Barn Swallow	*Hirundo rustica*	1,2	1,2,4, 8
Blue Jay	*Cyanocitta cristata*	1,2,13	1,2,4,8, 25,33
American Crow	*Corvus brachyrhynchos*	1,2, 11,13, 38	1,2,4, 14
Black-capped Chickadee	*Parus atricapillus*	1,2	1,2,4, 12
Tufted Titmouse	*Parus bicolor*		1,2,8
Red-breasted Nuthatch	*Sitta canadensis*		1,2
White-breasted Nuthatch	*Sitta carolinensis*	11,38	2,4,8
Brown Creeper	*Certhia americana*		1,2
House Wren	*Troglodytes aedon*		1,4
Golden-crowned Kinglet	*Regulus satrapa*		1,2
Ruby-crowned Kinglet	*Regulus calendula*		1,2
Eastern Bluebird	*Sialia sialis* *		1,2,5
Veery	*Catharus fuscescens*		1,2
Wood Thrush	*Hylocichla mustelina*	1,2	1,2,4
American Robin	*Turdus migratorius*	1,2,13,	1,2,4,8, 25,31,38
Gray Catbird	*Dumetella carolinensis*		1,2,4,14
Northern Mockingbird	*Mimus polyglottos*		2,6
Brown Thrasher	*Toxostoma rufum*		1,2,4,8
Cedar Waxwing	*Bombycilla cedrorum*		1,2,4,7, 8,12

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Northern Shrike	*Lanius excubitor*		1,2
European Starling	*Sturnus vulgaris*	1,2	1,2,4,8
Solitary Vireo	*Vireo solitarius*		1
Warbling Vireo	*Vireo gilvus*		4
Red-eyed Vireo	*Vireo olivaceus*		4
Yellow Warbler	*Dendroica petechia*	1,2	1,2,12
Magnolia Warbler	*Dendroica magnolia*		4
Yellow-rumped Warbler	*Dendroica coronata*		1,2
Blackburnian Warbler	*Dendroica fusca*		1,2
Pine Warbler	*Dendroica pinus*		1,2
Black-and-white Warbler	*Mniotilta varia*		1,2
American Redstart	*Setophaga ruticilla*		1,2
Ovenbird	*Seiurus aurocapillus*		4,8
Mourning Warbler	*Oporornis philadelphia*		4
Common Yellowthroat	*Geothlypis trichas*		4,12
Scarlet Tanager	*Piranga olivacea*	1,2	1,2,28
Northern Cardinal	*Cardinalis cardinalis*		1,2,4,5 12,33
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	1,2	1,2,4,8
Indigo Bunting	*Passerina cyanea*		1,2,4
Rufous-sided Towhee	*Pipilo erythrophthalmus*	1,2	1,2
American Tree Sparrow	*Spizella arborea*		1
Chipping Sparrow	*Spizella passerina*	1,2	1,2,4
Clay-colored Sparrow	*Spizella pallida*		4
Field Sparrow	*Spizella pusilla*		4,14
Vesper Sparrow	*Pooecetes gramineus*		4
Black-throated Sparrow	*Amphispiza bilineata*		1
Savannah Sparrow	*Passerculus sandwichensis*	1,2	1,2
Grasshopper Sparrow	*Ammodramus savannarum*		4
Fox Sparrow	*Passerella iliaca*	1,2	1,2
Song Sparrow	*Melospiza melodia*	1,2	1,2,4
Swamp Sparrow	*Melospiza georgiana*		4
White-throated Sparrow	*Zonotrichia albicollis*		1,2,4
White-crowned Sparrow	*Zonotrichia leucophrys*		1,2
Dark-eyed Junco	*Junco hyemalis*	1,2	1,2,8
Snow Bunting	*Plectrophenax nivalis*	1,2	1,2
Bobolink	*Dolichonyx oryzivorus*	1,2	1,2,4,8 12
Red-winged Blackbird	*Agelaius phoeniceus*	1,2, 38	1,2,4,8 12
Eastern Meadowlark	*Sturnella magna*	1,2	1,2,4,8

TABLE 6 (cont'd)

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Common Grackle	*Quiscalus quiscula*		1,2,4,8
Brown-headed Cowbird	*Molothrus ater*	1,2	1,2,4
Northern Oriole	*Icterus galbula*	1,2	1,2,4,8, 10,14,28, 33
Pine Grosbeak	*Pinicola enucleator*	1	1
Purple Finch	*Carpodacus purpureus*	1,2	1,2,8
Common Redpoll	*Carduelis flammea*	1,2	1,2
Hoary Redpoll	*Carduelis hornemanni*	1,2	1,2
American Goldfinch	*Carduelis tristis*	1,2	1,2,4,8, 14,33
Evening Grosbeak	*Coccothraustes vespertinus*		1,2,6
House Sparrow	*Passer domesticus*	1,2	1,2,4,8

* Denotes that the species is considered to be rare based upon recognized literature sources (See Sections 4.4 and 5.5).

TABLE 7: CHECKLIST OF MAMMALS RECORDED ON CANDIDATE SITE PI-13N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Eastern Cottontail	Sylvilagus floridanus	1,2,27	1,2,23
European Hare	Lepus europaeus	1,2	1,2,29
Eastern Chipmunk	Tamias striatus		1,2
Woodchuck	Marmota monax	1,2,27	1,2,8,31
Grey Squirrel	Sciurus carolinensis	1,2	1,2
American Red Squirrel	Tamiasciurus hudsonicus		1,2
Deer Mouse	Peromyscus maniculatus	1,2	1,2
White-footed Mouse	Peromyscus leucopus		2
Muskrat	Ondatra zibethicus	39	1,2,9, 21,38
Norway Rat	Rattus norvegicus		1,2
House Mouse	Mus musculus		2
American Porcupine	Erethizon dorsatum		1,2,29
Coyote	Canis latrans	2,27, 39	1,2,5,9
Wolf	Canis lupus		6
Red Fox	Vulpes vulpes	1,2,27	1,8,9,29,19
American Black Bear	Ursus americanus		1
Raccoon	Procyon lotor	1,2,38, 39	1,2,7,8, 9,15,18
American Marten	Martes americana		2
Striped Skunk	Mephitis mephitis	1,2	1,2,34
Bobcat	Lynx rufus *		8
White-tailed Deer	Odocoileus virginianus	1,2,27, 39	1,5,7,8, 23,24,29, 31,19

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5)

TABLE 8: CHECKLIST OF AMPHIBIANS AND REPTILES RECORDED ON CANDIDATE SITE PI-13N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Eastern American Toad	*Bufo a. americanus*		1,2
Gray Treefrog	*Hyla versicolor*	1,2	1,2
Bullfrog	*Rana catesbeiana*		2
Northern Leopard Frog	*Rana pipiens*		1,2
Common Snapping Turtle	*Chelydra s.serpentina*	1,2,11,39	1,2,30
Midland Painted Turtle	*Chrysemys picta marginata*	1,2	1,2
Northern Ringneck Snake	*Diadophis punctatus edwardsii*		1
Eastern Hognose Snake	*Heterodon platyrhinos* *		1,2,16
Eastern Milk Snake	*Lampropeltis t.triangulum*	1,2	1,2
Northern Water Snake	*Nerodia s.sipedon*		1,2
Eastern Smooth Green Snake	*Opheodrys v.vernalis*		1,2
Pine Snake	*Pituophis melanoleucas*		1
Northern Redbelly Snake	*Storeria o. occipitomaculata*		2
Eastern Ribbon Snake	*Thamnophis s.sauritus*		1,2
Eastern Garter Snake	*Thamnophis s.sirtalis*	1,2	1,2

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

TABLE 9: CHECKLIST OF FISH SPECIES RECORDED ON CANDIDATE SITE PI-13N AND IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Alewife	Alosa pseudoharengus		35
Rainbow Trout	Salmo gairdneri		34,36
Brown Trout	Salmo trutta		1,2,7,37
Brook Trout	Salvelinus fontinalis		1,2,16
Goldfish	Carassius auratus	27	
Carp	Cyprinus carpio		1,2
River Chub	Nocomis micropogon		35
Common Shiner	Notropis cornutus		35
Rosyface Shiner	Notropis rubellus		35
Fathead Minnow	Pimephales promelas		35
Longnose Dace	Rhinichthys cataractae		35
White Sucker	Catostomus commersoni		1,2,35
Northern Hog Sucker	Hypentelium nigricans		35
Brown Bullhead	Ictalurus nebulosus		2
White Bass	Morone chrysops		1
Rock Bass	Ambloplites rupestris		1,35
Pumpkinseed	Lepomis gibbosus		1,2
Smallmouth Bass	Micropterus dolomieui		1,2,37,35
Largemouth Bass	Micropterus salmoides		1,2
Yellow Perch	Perca flavescens		1,2
Rainbow Darter	Etheostoma caeruleum		35
Fantail Darter	Etheostoma flabellare		35
Johnny Darter	Etheostoma nigrum		35

TABLE 10: CHECKLIST OF BUTTERFLY AND MOTH SPECIES RECORDED ON CANDIDATE SITE PI-13N IN SITE VICINITY

		OCCURRENCE AND SOURCES	
COMMON NAME	LATIN NAME	SITE	VICINITY
Luna Moth	*Actias luna*		1,2
Cecropia Moth	*Hyalophora cecropia*	1,2	1,2
Eastern Black Swallowtail	*Papilio polyxenes asterius*	1,2	1,2
Tiger Swallowtail	*Pterourus g.glaucus*		1,2
West Virginia White	*Artogeia virginianus* *	1,2	1,2,16
Common Sulphur	*Colias p.philodice*	1,2	1,2
Snout Butterfly	*Libytheana bachmanii* *	1,2	
Great Spangled Fritillary	*Speyeria c.cybele*		1,2
Mourning Cloak	*Nymphalis a.antiopa*		1,2
Monarch	*Danaus plexippus*	1,2	1,2

* Denotes that the species is considered to be rare based upon recognized literature sources (see Sections 4.4 and 5.5).

DATA SOURCES FOR TABLES 5-10

1. Omagh United Taxpayers, 1984a.
2. Omagh United Taxpayers, 1984b.
3. Halton Region Conservation Authority, 1984a.
4. Ontario Breeding Bird Atlas, 1984.
5. Sweetman, 1984.
6. Austin, 1984.
7. Glinski, 1984.
8. Jaap, 1984.
9. Mackie, 1984.
10. Musgrave, 1984.
11. Gartner Lee Associates Limited, 1984a.
12. Regional Municipality of Halton, 1979.
13. Gartner Lee Associates Limited, 1984b.
14. Ontario Nest Records Scheme, undated.
15. Ontario Ministry of Natural Resources, 1979.
16. Omagh United Taxpayers, 1984c.
17. Juengel, 1984.
18. Scott, 1984.
19. Regional Municipality of Halton, 1978.
20. Halton Region Conservation Authority, 1984b.

DATA SOURCES FOR TABLES 5-10 (cont'd)

21. Jansen, 1984.
22. Davison, 1984.
23. McKee, 1984.
24. Marshall, J.B., 1984.
25. Marshall, J.C., 1984.
26. Jones, 1984a.
27. Marshall, C., 1984.
28. Rowe, 1984.
29. Clancy, 1984.
30. Ford, 1984.
31. Endicott, 1984.
32. Stadler, 1984.
33. Carleton, 1984.
34. Ontario Ministry of Natural Resources, 1973a.
35. Ontario Ministry of Natural Resources, 1973b.
36. Thurlow and Associates, 1977.
37. Regional Municipality of Halton, undated.
38. Gartner Lee Associates Limited, 1984c.
39. Jones, 1984b.
40. Gartner Lee Associates Limited, 1984f.

8.0 SUMMARY OF SITE INTERVIEW DATA

Biological data and comments on biological resource use on or near Site LF-4N from Ecologistics' field interview ("Walk-and-Talk") forms are summarized in Table 11. Interview numbers are related to identifications assigned by Ecologistics Limited during the collection of these data.

Maps accompanied the interview forms and provided locations of certain features. Significant feature locations were input to Figures 3 and 4.

The biological questions placed on the interview forms are contained in Table 12. Copies of completed "Walk-and-Talk" survey forms are on file with GLAL.

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-13N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. G. Juengel	70-143	PI-13N(SV)	6-1	• 55 bird species observed • fuelwood • harvests wild strawberries, raspberries, mushrooms • maple syrup, honey from apiary • harvests fruit trees and vegetables
Mr. C. Sweetman	70-136 70-135	PI-13N(SV)	52-2	• blue herons in woodlot and other bird species • deer, coyotes • fuelwood • harvests wild leeks • maple syrup • maple syrup also from woodlot on 70-140
Mr. Chris Austin	70-146	PI-13N(SV)	237	• Salmon, carp, trout • wolves, large number of bird species • fishing in river • harvest wild berries • harvest vegetables
Messrs. J. & S. Scott	70-001	PI-13N(SV)	609	• none

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-13N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. A. Glinski	70-145	PI-13N(SV)	128-1	● 45 bird species observed ● trout in creek ● deer ● fuelwood ● maple syrup ● harvest elderberries, strawberries, raspberries
Mr. & Mrs. H. Jaap	70-142	PI-13N(SV)	234-1	● over 50 bird species observed ● fuelwood ● fishing ● hunt deer, rabbits ● harvest vegetables
Mr. Adwin Jansen	70-073	PI-13N(SV)	270	● hawks and blue herons ● fuelwood ● harvest raspberries
Mr. & Mrs. R.A. Davison	70-075-10	PI-13N(S)	103-1	● harvest wild strawberries
Mr. & Mrs. Arnold McKee	70-072	PI-13N(SV)	411-G	● deer
Mr. John B. Marshall	60-013-20) 90-037) 60-013-10) 60-014)	PI-13N(SV)	59-2	● deer, geese, ducks mainly on 60-013-20 and 60-014 ● fuelwood ● harvest wild strawberries

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-13N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. John C. Marshall	60-014-10 60-014	PI-13N(SV)	210-2	● several bird species ● hunting
Mr. Daniel Jones	70-150-01	PI-13N(S)	140-2	● fuelwood ● maple syrup ● hunting ● harvest wild mushrooms
Messrs. Norm & Harold Biggar	70-073) 70-151) 70-152-001 60-002) 60-047) 90-052) 30-125-10) 30-123-01)	PI-13N(SV)	108-2	● none
Mr. George Jellaczyc	70-139 70-178	PI-13N(SV)	58-2	● none
Mr. J.W.L. Monaghan	70-144	PI-13N(S)	56-2	● none

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-13N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. Colin Marshall	70-074-01) 70-075-01) 70-144)	PI-13N(S)	1-2	● deer ● great blue herons and other bird species ● foxes, coyotes ● fuelwood ● hunt rabbits, foxes ● harvest wild mushrooms and strawberries
	40-118	PI-13N(SV)		
Mr. Bill Wilson	75-075-01 70-150-01 70-074-01	PI-13N(S)	53-2	● none
Mr. & Mrs. M.A. MacKinnon	60-039	PI-13N(SV)	590	● none
Mr. & Mrs. W.J. Rowe	70-147	PI-13N(SV)	99-1	● several bird species ● fuelwood
Mr. & Mrs. A. Clancy	70-152	PI-13N(SV)	235-1	● deer, foxes ● fuelwood ● harvest strawberries and raspberries
Mr. & Mrs. J.C. Ford	70-076 90-053	PI-13N(SV)	294	● none
Mr. & Mrs. McCann	100-008 100-044	PI-13N(SV)		

TABLE 11: SUMMARY OF SITE INTERVIEW (WALK-AND-TALK) DATA FOR SITE PI-13N

INDIVIDUALS INTERVIEWED	ASSESSMENT ROLL NUMBER	SITE(S) OR SITE VICINITY (SV)	INTERVIEW NO.	BIOLOGY COMMENTS
Mr. & Mrs. Allan Endicott	70-070	PI-13N(SV)	403-G	● deer ● harvest wild strawberries, leeks, raspberries and mushrooms
Mr. S. Stadler	60-015 100-043	PI-13N(SV)	256-2	● blue heron
Mr. Keith Merry	70-153 90-054-10 94-054-02 60-002 70-152-002	PI-13N(SV)	595	● none
Mr. S. Carleton	70-176	PI-13N(SV)	225-1	● several bird species ● harvest leeks, strawberries, raspberries ● fuelwood

Interview Identification Number: ________

TABLE 12: BIOLOGY QUESTIONS LISTED ON WALK-AND-TALK INTERVIEW FORM

PHYSICAL RESOURCES - BIOLOGY

We are also interested in asking you some questions about the plant and animal life on your property and in this area. This information will help us to identify sensitive environmental areas or resources that could be affected by OWMC facilities.

1. Can you tell us about any rare or unusual birds, animals, fish, trees or plants on your property? Please show the locations of these wildlife on the map.

2. Can you tell us if any of the fish, wildlife or plants are harvested for human use or consumption, e.g., firewood, fishing, hunting, edible plants (strawberries, leeks, mushrooms, maple syrup)? (What, where, how much and by whom?)

9.0 BIOLOGY

SAMPLE STATIONS

Locations of sample stations were mapped at 1:10,000 scale. Completed data forms and station location maps are in working files at GLAL.

Table 13 is an example of a completed field data form. It is for station 4 on Site LF-4N.

TABLE 13: EXAMPLE OF COMPLETED BIOLOGICAL STATION DATA FORM - PI-13N

PI-13N

FIELD INVESTIGATIONS

STATION 6 ROLL 4 PHOTO(S) 3[illegible]

VEGETATION

VEGETATION ASSOCIATION [illegible] FRI DOMINANTS H / Aw5 Mh3 Bo1 Or1

Strata	% Cover	Plot Size	Dominant Species - Sample Collected: (c)
Tree Species >6m	30	5	[illegible]
Tree Species <6m	20	5	Ulmus americana Tilia americana
Shrub Species >1.5 m	—	5	
Shrub Species <1.5 m	5	5	Parthenocissus [illegible]
Graminoid/Herb Species	1	2	[illegible] Leonurus cardiaca
Moss/Lichen Species	—	2	

Snags/Hectare

Average Canopy Height: FRI 12m, Field 14m Surface Wetness 0 Vegetation Mapping Change

Comments / Rare Or Uncommon Species:

WILDLIFE

[illegible]
[illegible]

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

[illegible]

Type 5 Average Width 1m Average Depth [illegible] Permanence i Turbidity

Approximate Area

Shoreline Conditions C V Bottom Conditions C

Fish And Invertebrate Species Observed: none

Submergent, Emergent Plant Species: [illegible]

Comments / Rare Or Uncommon Species:

[illegible]

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

[illegible] primarily [illegible]
[illegible]

PI-13N-17) Elymus virginicus L.
PI-13N-18) Glyceria striata (Lam) Hitch.
PI-13N-19) Euonymus obovatus Nutt.

Botanical Verification:
Thalictrum dioicum
Lysimachia ciliata
Rubus pubescens

PI-13N-20) Carex intumescens Rudge
PI-13N-31) Plagiomnium cuspidatum

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10.0 OWMC
PHASE 4A — BIOLOGY
FIELD PROTOCOL

OWMC
PHASE 4A - BIOLOGY
FIELD PROTOCOL

PROJECT 84-S18.2 SEPTEMBER, 1984

Gartner Lee Associates Limited

Consulting Engineering
Geolologists
Biologists and
Hydrogeologists

Toronto - Buttonville Airport ▪ Markham, Ontario ▪ L3P 3J9 ▪ 416-477-8400
Telex - 06-986278

September 10, 1984.

Mr. Jim Micak,
Environmental Planning Co-ordinator,
Ontario Waste Management Corporation,
2 Bloor Street West, 11th Floor,
Toronto, Ontario.
M4W 3E2

Dear Jim:

Re: Field Protocol - Phase 4A Biology
84-S18.2

Enclosed please find three (3) copies of the final field protocol followed during Phase 4A Biology work. Revisions reflect the altered scope of fieldwork conducted. References to site vicinity, access routes and service corridors have been deleted.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

K. W. Dance, M.Sc.,
Senior Biologist.

KWD:dc
encls.
cc: R. Szudy, OWMC
D. Osmond, GLAL
T. Hilditch, GLAL

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1.0 OBJECTIVES AND SCOPE

The biology field work conducted during Phase 4A of the site selection process will accomplish three major tasks.

- The vegetation cover mapping completed in Phase 3 will be ground-truthed.
- Biological features documented in literature reviewed, and data obtained from the agency and public contact activities will be verified.
- Additional, original biological data will be collected at a reconnaissance level on flora, fauna and resource use.

The data provided by this task will identify biological constraints to be considered during site comparison.

Field work will be undertaken on all eight candidate sites.

The time required to complete on-site field work will vary depending on site size, biological diversity and degree of public involvement. It will also depend upon whether permission is received for access to properties. It is likely that an average of 3 or more days per site will be required.

This outline provides a description of the protocol to be followed in biological field studies and the various forms which will be used in the field.

2.0 METHODS

Field investigations will be conducted at a reconnaissance level, to allow verification of existing information and to acquire new data.

On-site investigations will be conducted only on those properties where permission has been obtained from the owner or tenant. This will be recorded on the Site Access Permission Form (Section 3.1).

Proposed field transects and sampling points will be established prior to field work, using existing information and mapping as well as air photo interpretation. These may be modified with field judgment. An attempt will be made to sample all vegetation associations. The degree of sampling effort will be related to the complexity of the unit examined and the known presence of rare species of flora and fauna.

Field observations will be recorded on "Field Observation Sheet - Biological Stations: Site". A sample of the form is presented in section 3.2. Information to be recorded is described in section 2.1.

2.1 FIELD PROTOCOL - SITE WORK

The numbered segments in this discussion correspond with pertinent sections of the field data sheet. Techniques for data collection on-site and field form completion are discussed herein.

2.1.1 BACKGROUND (SECTION A ON FIELD OBSERVATION SHEET)

The information to be recorded include:

- The appropriate candidate site number
- The roll numbers of air-photo used during field investigations
- The name(s) of field observers.
- The date, time and duration of the field visit.
- The current weather and previous days weather. This will include remarks about cloud cover, precipitation, air temperature, relative wind speed (calm, breeze etc.) and direction. Special note will be made about recent storm events which may have had some impact on field observations (especially aquatic observations).
- The roll number and series of photographs taken during the field visit. Specific photographs taken will correspond with the appropriate station number.
- Maps used during the field investigation will be coded. These codes will appear in the background section of the data sheet and the maps would be filed with the data. The code will be composed of the candidate site label plus a number (e.g. LF-3C-01).

2.1.2 DOCUMENTED IMPORTANT BIOLOGICAL FEATURES (SECTION B ON FIELD OBSERVATION SHEET)

Existing information indicating the location of significant habitats, flora and fauna, and resource use will be depicted on an accompanying map and entered in this section of the field observation form prior to field investigations. For example if a Significant Environmental Unit (SEU) occurs within a site and contains a rare plant species, the spot location will be mapped as a station number and cross referenced in section B of the field form. Entries in section B will alert the field personnel that these key features should be examined and evaluated in the field.

Additional biological information requiring field checking will be drawn from the completed walk and talk questionnaires.

The relevant landowners will be contacted. This process will be recorded on the Public Contact - Local Data Collection forms (section 3.3).

2.1.3 FIELD INVESTIGATIONS

This section of the Field Observation Sheet documents characteristics of vegetation, wildlife and aquatic habitat observed at specified stations. The roll and photograph numbers of pictures taken will be indicated along with the relevant station number. The location and direction of the photograph taken is to be mapped as depicted in section 3.6.

The results of these observations will assist in a relative comparison of the biological importance of the eight candidate sites.

VEGETATION: Information collected about the vegetation studied will be used in a number of ways.

The vegetation cover mapping will be field checked and rare or uncommon species identified. Unique habitat features will be determined. Several pieces of data will be used to analyze the relative quality and quantity of wildlife habitat present. The following data are to be collected.

- Using the legend on the first page of the Field Observation Sheet, the appropriate vegetation association examined will be noted. Section 3.4 of this protocol contains vegetation association definitions. Descriptors (also coded) will be used to refine the designation.
- Several distinct strata or layers of vegetation may be present in each vegetation community sampled. For

example, grasses shrubs and trees may occur. Space is provided to record approximate percent cover and dominant species for each of the five strata listed in the vegetation section of the Field Observation form. This information will be used to assess the wildlife habitat potential. It will also provide information about habitat diversity and the value of forestry resources present.

Percent cover can be calculated quickly for all strata. The calculation, which standardizes values between field crews uses a standard plot size.

The plot size used for all trees and shrubs is a 5 metre radius from the sample point. This encompasses an area of 78.5 m^2. The percent cover of a stratum is calculated by multiplying the number of stems of that stratum in the radius by an estimate of average maximum crown area of the stems. This figure, divided by the total area, 78.5 m^2 gives an approximate cover percentage.

The average maximum crown area is a visual estimate of the average area covered by the crowns of the stems included in the count. For example, if ten stems were counted in the 5 metre radius, those ten crowns would be examined and an average individual crown area would be estimated.

For the remaining strata, graminoids, herbs, mosses and lichen, a 2 metre radius plot size will be used for the calculation with a corresponding area of 12.6 m^2. Where the cover percentage is less than 10% for the moss/lichen layer, recording dominant species is not required. Plot size used for the calculation will be recorded.

The results of the calculation made for the lower strata will be modified by a visual inspection of surrounding ground flora. This will be done if the 2 metre radius does not appear to accurately characterize the groundcover at the sample point and surroundings.

The Latin names (genus and species) of the two or three dominant plant species will be noted for each stratum to assist in the characterization of the community. This information is available for tree species >6 metres high from the Forest Resource Inventory (FRI) mapping. Those species will be recorded and verified in the field. Other strata must be field evaluated. If the dominant plant species is not identified in the field, a collection will be made based upon standard practices (Savile, 1962). Subsequent office verification is required. A "(c)" will denote a species was collected.

Specimens will be collected for all plants suspected to be rare or uncommon based on field judgement. This will allow a more complete analysis of rare species present. Collections will be recorded on a standard field collection sheet (section 3.5).

- Average dominant canopy height may again be taken directly from the FRI mapping and field checked visually.
- Surface wetness provides a quick indication of the local moisture regime. Dry soil crumbles when squeezed while moist soil can be compacted somewhat without crumbling. Wet soil is more heavily saturated and releases water upon squeezing. This characteristic will assist in the assessment of wildlife habitat and the identification of the vegetation association.

- The second last space in the vegetation section provides a crosscheck with the office vegetation interpretation and mapping. Should the vegetation association determined from fieldwork not correspond with that mapped earlier, this space should be checked off. Vegetation association corrections will be indicated in red on the map (see section 3.6). The same map will be utilized in the field to crosscheck interpretation and ensure that woodlot boundaries or size have not been altered. Cross-hatching in red (section 3.6) will be used to show boundary changes.
- The last space in the vegetation section provides room to describe rare or uncommon plant species or unique habitat features (eg. oak-savannah). Locations will be mapped accurately, assigned station numbers and described in detail.

Descriptions of the apparent reproductive status and health (eg. presence of rot in trees) of populations of rare species will be recorded.

WILDLIFE: Wildlife observations will be made to note the typical species present and to determine whether any rare or uncommon species inhabit the site. The following data will be collected:

- Wildlife observations will be made at each vegetation sample station. Important casual observations made away from a station are to be recorded and described here or in the comments section, should space be limited.
- The common name of the species observed is to be recorded. All flora and fauna common names are to be capitalized. eg. Red-winged Blackbird.

- Following the species name the number of individuals observed will be recorded if known. eg. Red-winged Blackbird-2.
- An observation code will appear in brackets after each to indicate the type of observation made eg. Two birds were heard singing: Red-winged Blackbird-2(S). The code appears in the legend on the Field Observation Sheet.
- A section is provided for comments about wildlife. Uncommon or rare species will be recorded and additional detail with respect to the observation will be noted. Again, for rare or uncommon species, the location will be mapped as a station with appropriate observations recorded.

AQUATIC HABITAT: Aquatic observations will assist in evaluating the quality and quantity of habitat present. This will allow an interpretation and evaluation of potential for significant fisheries. No fish collections will be made. Observations of other wildlife using aquatic habitat will be made.

The information to be recorded is explained below.

- The type of surface water feature will be recorded on the observation sheet for the station sampled. The feature will be a stream, either perennial or intermittent confined to a distinct channel by banks. Ponding observed will be recorded as distinct, with a well-defined outline and shape (these features will commonly be man-made), or diffuse with swales. The diffuse condition includes shallow irregular ponding in woodland depressions as well as in other locations where

a well-defined boundary is not obvious. The codes used are found in the legend on the Field Observation Sheet.

- Average width and depth of actual surface flow in the channel will be estimated visually. Where possible, for ponds and swales an approximate area is to be recorded. All measurements are to be metric.
- The measurements above will help to determine the permanence of the waterbody, especially if the measurements are made during low flow periods. Indicators of intermittence include discontinuous flow and the presence of emergent or terrestrial plant species in the waterbody channel or depression. Permanence is important in predicting the species that utilize the waterbody and whether that use is seasonal.
- A visual check of the turbidity of the waterbody is to be made according to the legend provided on the observation sheet.
- Indicate shoreline conditions on the observation sheet; note erosion, nature of the soils (silt, clay, sand, gravel etc.) and the occurrence of vegetation. A combination of symbols could occur. For example an unstable (eroding), steep bank of clay devoid of vegetation would be coded "e c".
- Indicate on the observation sheet, the nature of the stream/pond bottom in terms of substrate (silt, clay, sand, gravel, etc), and the occurrence of aquatic plant species. Again, a combination of symbols could occur. For example, a stream bottom of sand with some gravel would be recorded "sa g". Observation codes appear in the legend on the Field Observation Sheet.

The above observations are important for the identification of habitat types required for various fisheries. This is especially important for the identification of spawning areas. For example, Northern Pike use shallow waterbodies with emergent vegetation for spawning, whereas, Brook Trout use clear, cool, running streams with a gravel substrate. Again, no collections will be made and habitat value will be inferred.

- Indicate the species of reptiles, amphibians, fish, invertebrates and the dominant submergent and emergent plant species observed in the space provided.
- The comments section provides some room to record rare or uncommon species observed and notes of particular importance with respect to habitat conditions for these species. Evidence of fish spawning or potential spawning habitat will be noted.

2.1.4 REMARKS

- This space is left for recording additional biological information.

Active or passive uses of the vegetation and wildlife will be noted with comments about the type and magnitude of use that occurs (eg. presence of maple sugar shack and obvious tapholes on sugar maple trees, cordwood stacks, etc.). This information is important for the identification of potential pathways to human foodchains.

- As well, special features such as rare species will be documented more fully in this section, in conjunction with sketch maps, where applicable.

- Evidence of misuse of the resources will be noted (e.g. debris present near access points).

- Evidence of resource management and rehabilitation will be noted (e.g. use of erosion control structures along stream banks).

- Comments about documented important biological features will also be made.

3.0 APPENDICES

3.1 SITE ACCESS PERMISSION FORM

No. ________

CANDIDATE SITE ______________________________

PROPERTY ROLL NUMBER(S) ______________________________

____

LANDOWNER:

NAME ______________________________

ADDRESS ______________________________

TELEPHONE NUMBER ______________________________

LANDOWNER CONTACTED BY:

TELEPHONE ____________ DATE OF CONTACT:

MAIL ____________ ______________________

VISIT ____________

PERMISSION TO ENTER PROPERTY:

GRANTED ____________

NOT GRANTED ____________ REASON ______________________

PERMISSION TO COLLECT PLANT SAMPLES:

GRANTED ____________

NOT GRANTED ____________ REASON ______________________

COMMENTS: ______________________________

____

____

____

____

Gartner
Lee
Associates
Limited

3.2

FIELD OBSERVATION SHEET	**BIOLOGICAL STATIONS :**	**SITE**

Candidate Site: ____________________

OWMC 84-S18.2

Gartner Lee Associates Limited

A) Background

Air Photos: ____________________

Photographs Taken:

Roll: ________ **Photos:** ____________

Corresponding Maps:

____

____

Observer(s): ____________________

Date Of Visit: ____________________

Time & Duration ____________________

Weather:

Present: ____________________

Previous Day: ____________________

B) Documented Important Biological Features · Issues To Field Check

Habitat: ____________________

____

____

Flora: ____________________

____

____

Fauna: ____________________

____

____

Comments: ____________________

____

____

____

____

____

* Source Of Data In Brackets After Information

C) Field Observation Sheet Legend

Vegetation

• Vegetation Association

Forest:	deciduous	D	Upland = u Lowland = l
	coniferous	C	
	mixed	M	
Thicket:	shrub	T	
Field:	crop land	C	
	recently abandoned	FR	
	old	FO	
	successional	FS	
Others:	marsh	M	
	industrial/residential/ manicured	R	
Descriptors:	flooded	(F)	
	cutover and/or recent secondary succession	(C)	
	post-fire succession	(P)	
	grazed	(G)	
	drained	(D)	
	plantation	(Pl)	

• Surface Wetness

dry	0
moist	1
wet	2

Wildlife

• Observation Code

observed	o
call/song	c
tracks	t
scats	s
browse	b
workings	w

Aquatic Habitat

• Type

stream	s
pond	p
diffuse ponding and swales	dp

• Permanence

possibly permanent	p
probably intermittent	pi
intermittent	i

• Turbidity

clear	c
cloudy	cl
turbid	t

• Shoreline Conditions

eroded	e
silt	si
clay	c
sand	sa
gravel	g
vegetated	v

• Bottom Conditions

silt	si
clay	c
sand	sa
gravel	g
vegetated	v
bedrock	b

Page ____ of ____

SITE

SITE ____

FIELD INVESTIGATIONS

STATION ________ ROLL ____ PHOTO(S) ____

VEGETATION

VEGETATION ASSOCIATION ________ FRI DOMINANTS ________

Strata	% Cover	Plot Size	Dominant Species - Sample Collected:(c)
Tree Species>6m			
Tree Species <6m			
Shrub Species >1.5 m			
Shrub Species<1.5 m			
Graminoid/Herb Species			
Moss/Lichen Species			

Snags/Hectare ____

Average Canopy Height: FRI ____, Field ____ Surface Wetness ____ Vegetation Mapping Change ____

Comments / Rare Or Uncommon Species:

WILDLIFE

Comments/Rare Or Uncommon Species:

AQUATIC HABITAT

Type ____ Average Width ____ Average Depth ____ Permanence ____ Turbidity ____

Approximate Area ____

Shoreline Conditions ____ Bottom Conditions ____

Fish And Invertebrate Species Observed: ____

Submergent, Emergent Plant Species: ____

Comments / Rare Or Uncommon Species:

REMARKS

NOTE: Additional Biological Data, Resource Use, Etc.

3.3 PUBLIC CONTACT - LOCAL DATA COLLECTION

No.______

CANDIDATE SITE ____________________

PROPERTY ROLL NUMBER(S) ____________________

LANDOWNER:

NAME ____________________

ADDRESS ____________________

TELEPHONE NUMBER ____________________

LANDOWNER CONTACTED BY:

TELEPHONE ________

MAIL ________

VISIT ________

DATE OF CONTACT: ____________________

ISSUE(S) TO DISCUSS:

3.4 VEGETATION ASSOCIATION METHODOLOGY AND DEFINITIONS

METHODOLOGY: Vegetation analysis in Phase 3 of the site selection process was based upon air photo interpretation. Phase 4A includes on-site data collection and a more careful examination of vegetation associations and habitat types.

Vegetation associations utilized in Phase 3 have been evaluated and refined. Phase 4A evaluation techniques draw heavily from existing literature.

Ontario Hydro has recently conducted work to develop a woodlot evaluation system for lands south of the pre-Cambrian Shield in Ontario. The documents produced thus far have reviewed all vegetation and classification systems relevant to the study area. The document includes review of the works by Maycock (1980) and a parallel system for wetlands by Environment Canada and the Ontario Ministry of Natural Resources (1984).

These systems were modified for use during Phase 4A to reflect a number of objectives.

- consistency with Phase 3 vegetation analysis.
- consistency with general classifications produced by other researchers in the field.
- definition of only those vegetation features likely to be encountered.

DEFINITIONS:

Forest: Forest is defined as land having greater than 10% canopy cover composed of tree species greater than 6 metres tall.

DECIDUOUS: forest is composed of 80% or more deciduous trees.

CONIFEROUS: forest is composed of 80% or more coniferous trees.

MIXED FOREST: is a combination of deciduous and coniferous species, not matching the former definitions.

All three associations may be found in upland or lowland situations. Moisture regimes in upland situations are generally dry to moist (xeric to mesic) whereas those in lowland situations can be wet to flooded (hydric to saturated) (Hounsell and Risley, 1982).

The lowland forests are commonly referred to as Swamp features by several authors including Environment Canada and Ontario Ministry of Natural Resources (OMNR), 1984.

Common deciduous species likely to be encountered include Acer saccharum, Quercus rubra, Q. alba and Fraxinus americana. Common coniferous species include Pinus strobus, Tsuga canadensis and Thuja accidentalis. Coniferous species including Picca glauca and Pinus resinosa are also encountered in plantations.

In addition to the common forest associations anticipated in the study area, rare or uncommon plant species and habitat characteristic of the Deciduous Forest Region (Rowe, 1977) will probably be encountered. An example of such a community is the Oak Savannah. Generally, this community is dominated by mature, even-aged, open growth oaks. Regeneration is sparse and the canopy cover is generally less than 50% (Pratt, 1979). Unusual occurrences such as these will be flagged on the Field Observation sheets.

Thickets: Thicket lands must have a canopy cover of greater than 25%, composed of shrub species (OMNR, 1983) and less than 10% composed of tree species >6 m tall.

Common shrub species likely to be encountered include Crataegus sp., Cornus racemosa and Spirea alba.

Field: Field associations occur in varying degrees of succession. This system classifies them by the degree of natural vegetation present, ranging from a cultivated crop devoid of native plants to an old field with a greater percentage of native herbaceous plants.

Cropland: This land is currently in agricultural production for crops or pasture. These activities inhibit the succession of native vegetation. Also included in this designation are fallow lands cropped in the past and awaiting agricultural production in the near future.

Recently Disturbed Fields: These vegetation associations have experienced recent disturbances which have disrupted the growth of native plants. The area is then dominated by non-native taxa.

The disturbances could include past agricultural practices (e.g. cropping) or the clearcutting of forested lands.

Assuming further disturbances do not occur, the vegetation will progress to that associated with old fields.
Old Fields: This association has at least 2 of the 5 dominant plants being native, not typical of disturbed sites (Pratt, 1979). While dominated by herbs and grasses, a pioneer thicket community of up to 25% canopy and a tree community of up to 10% canopy may be present.

This is a very general definition. The distinction between recently disturbed and old fields is at times difficult. The rate of succession of field is dependent upon a number of factors including moisture regime and soil conditions.

The perception of the ratio of native versus non-native species in a field is also dependent upon the season observed. For example, goldenrods may appear dominant in the late summer, during flowering when other groups of flora are past flowering and therefore less visible (Maycock and Guzikowa, 1984).
Others:
WETLANDS: Wetlands are lands that are seasonally or permanently covered by shallow water as well as lands where the water table is close to or at the surface. The soils are hydric and the wetlands are dominated by hydrophytic or water-tolerant plants (Environment Canada and OMNR, 1984).

Swamps, or lowland forest as well as lowland thicket are examples of wetlands which are discussed earlier. A third wetland type which occurs on several of the candidate sites is marsh.

MARSH: The marshes encountered in this study are generally small and are associated with lowland depressions. These communities are dominated by narrow-leaved, broad-leaved and robust emergent plant species including *Typha angustifolia* and *Scirpus atrovirens*. Patches of marsh dominated by open water, with floating and submerged plants may be present. Specific examples of these plant groups may be found in Environment Canada and OMNR (1984).

UNCLASSIFIED: Industrial, residential and manicured areas, roads, railroads and open bodies of water are included in this designation. Disturbance to vegetation present such as the introduction of non-native species and the mowing of grassed areas, are common. Occurrences of these features will be mapped as unclassified. (e.g. industrial lands on candidate site PI-27E).

Descriptors:

RECENTLY LOGGED: This descriptor applies to existing woodlands. It highlights an area where recent logging has impacted a woodland community. Impacts could include rare species displacement, altered forest structure and the introduction of non-native plant species, depending upon the intensity of logging activities. This descriptor appears as a lower case "rl" in brackets after the vegetation association, e.g. D1(rl).

GRAZED: Lands excluding those defined as cropland, used for grazing domestic livestock are highlighted because of potential impacts on the vegetation community. Grazing of woodlands damages both the regenerative forest and herbaceous ground flora layers and leads to soil compaction. This designation is applied as a lower case "g" in brackets after the vegetation association, e.g. D1(g).

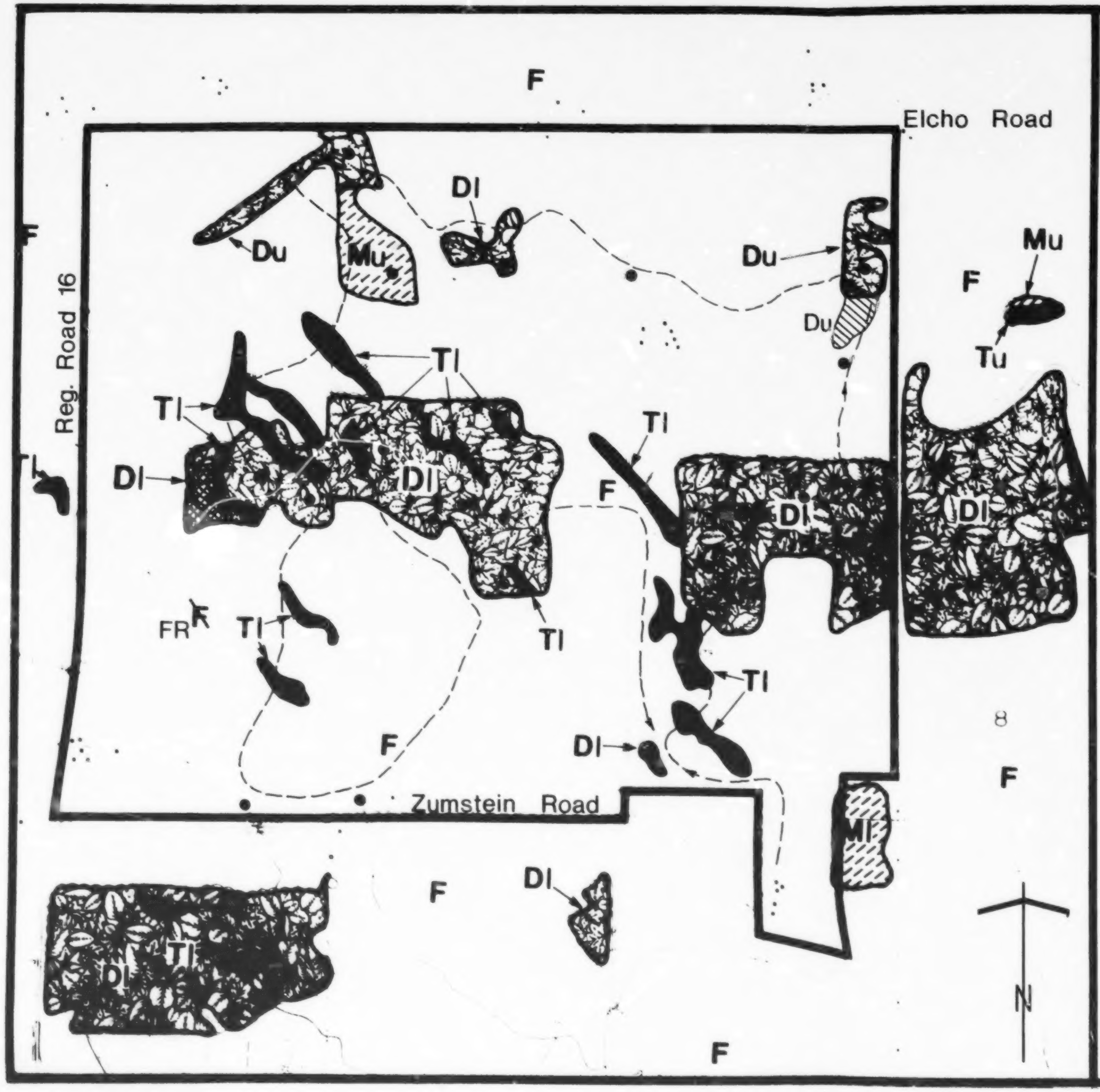
PLANTATION: This descriptor highlights the occurrence of a "manmade" forest. Generally coniferous, its dominants often include White Pine and White Spruce. It is indicated by a lower case "pl" in brackets after the vegetation association definition, e.g. Cu(pl).

MULTIPLE DESCRIPTORS: The occurrence of these is possible. For example, a grazed upland deciduous plantation would be represented by, Du(g,pl).

3.5

Herbarium / Reseacher / Date

County	Township	Lot—Con.	Location	Date	Collector	No.	Habitat and Notes


F
Elcho Road
Reg. Road 16
F
Du
Mu
Dl
Du
Du
Mu
F
Tu
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Tl
Tl
Dl
Dl
Dl
Dl
F
FR
Tl
Tl
Tl
F
Dl
Zumstein Road
8
F
Ml
F
Dl
Dl
Tl
F
N

3·6

Field Map 1
Vegetation Mapping
LF-3C-01

Legend

●	Proposed Sample Points
– – –	Proposed Fieldwork Transect

Changes In Mapping

▨	Add Habitat
▩	Delete Habitat
FR	Changed Designation

Vegetation Cover Types

D	Deciduous
C	Coniferous
M	Mixed
F	Field (cultivated or pasture)
H	Hedgerow (major)
T	Thicket

Cover Type Descriptors

l	Lowland
u	Upland

6.2	Significant Environmental Unit (SEU)

Scale 1:10,000

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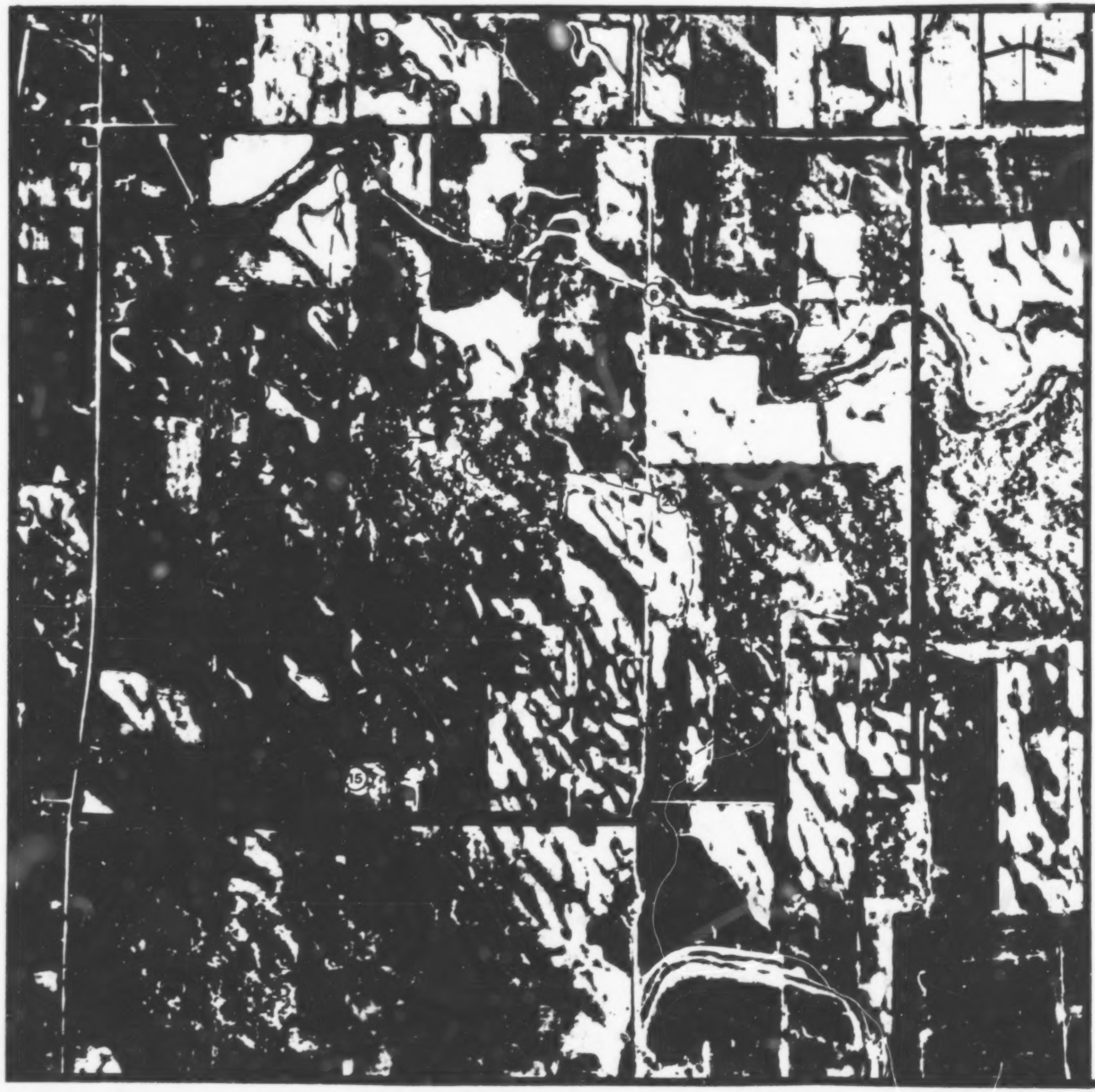

3·7

Field Map 2
Field Work Studies
LF - 3C - 02

Legend

⑥	Field Observation Station (example)
P6 →	Photograph And Direction Taken
- -	Transect Followed In Field

MAP NOTES

Scale 1:10,000

Gartner
Lee
Associates
Limited

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